

**INDEX OF SHEETS**

SHEET NO. \_\_\_\_\_ DESCRIPTION \_\_\_\_\_  
 (SEE SHEET 2 FOR INDEX OF SHEETS)

CONTRACTOR: \_\_\_\_\_  
 DATE OF LETTING: \_\_\_\_\_  
 DATE WORK BEGAN: \_\_\_\_\_  
 DATE WORK COMPLETED: \_\_\_\_\_  
 DATE WORK ACCEPTED: \_\_\_\_\_  
 FINAL CONTRACT COST: \$ \_\_\_\_\_  
 LIST OF APPROVED FIELD CHANGES:

# STATE OF TEXAS

## TEXAS DEPARTMENT OF TRANSPORTATION

### PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT  
CONSISTING OF REPLACE BRIDGE AND APPROACHES

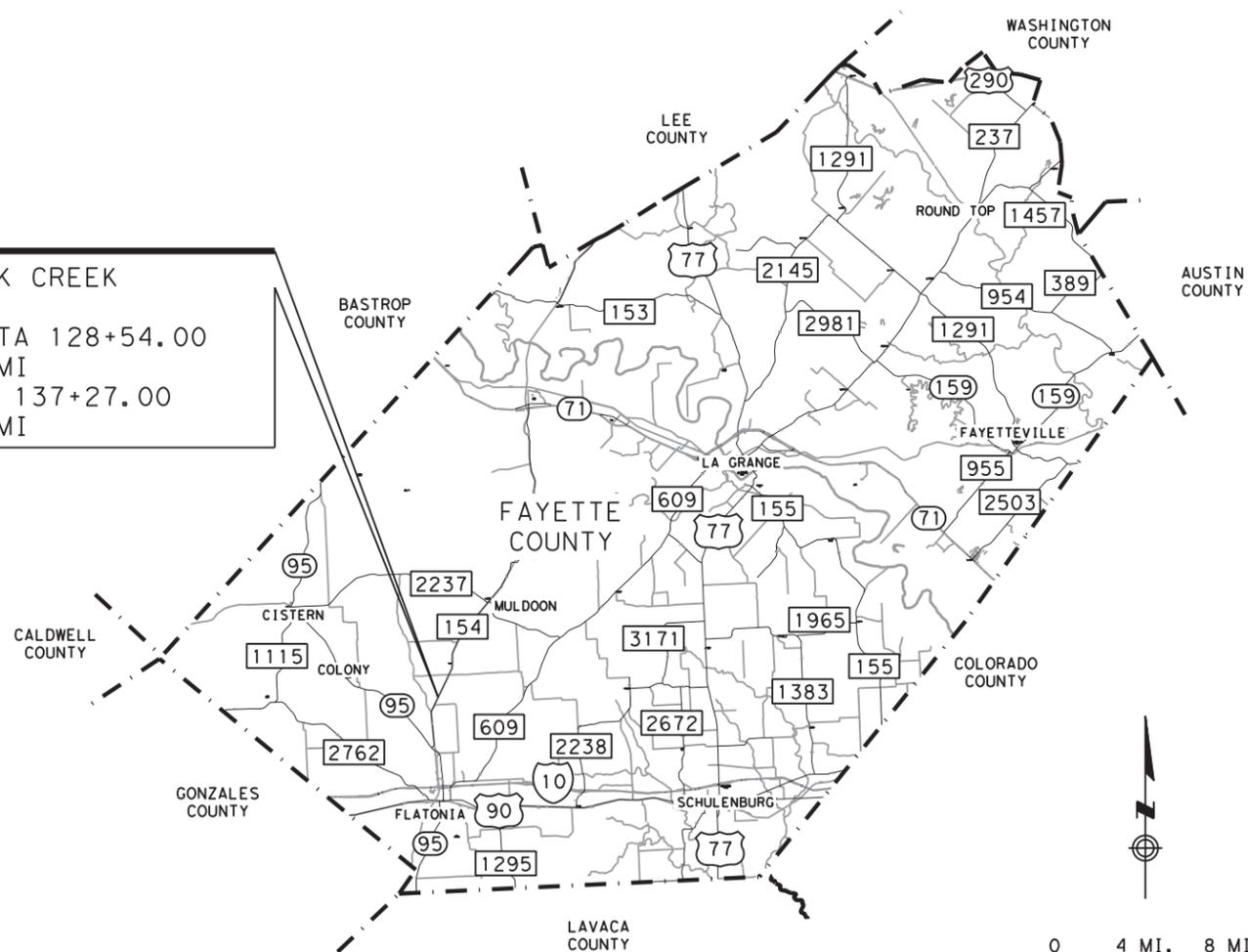
PROJECT NO. BR 2023(900)  
FAYETTE COUNTY - FM 154  
LIMITS: AT PIN OAK CREEK

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	BR 2023(900)	1
STATE	STATE DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		HIGHWAY NO.
		FM 154

HIGHWAY: FM 154  
 LIMITS: AT PIN OAK CREEK  
 FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR  
 ADT: 684 VPD (2021), 944 VPD (2041)  
 DESIGN SPEED = 60 MPH

ROADWAY LENGTH= 783.00 FT. = 0.148 MI.  
 BRIDGE LENGTH= 90.00 FT. = 0.017 MI.  
 PROJECT LENGTH= 873.00 FT. = 0.165 MI.

FM 154 AT PIN OAK CREEK  
 CSJ: 0334-08-037  
 BEGIN PROJECT: STA 128+54.00  
 TRM 476 + 0.712 MI  
 END PROJECT: STA 137+27.00  
 TRM 476 + 0.547 MI

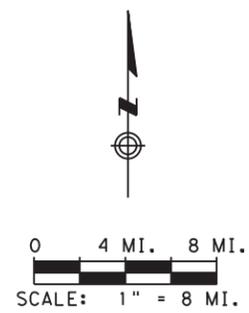


SUBMITTED FOR LETTING: \_\_\_\_\_  
 PROJECT MANAGER: *Hayden Morris* 03/22/2023

**Kimley»Horn**  
 F-928

RECOMMENDED FOR LETTING: 3/29/2023  
 DocuSigned by: *Jeffery Vinklarek, P.E.*  
 DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING: 3/29/2023  
 DocuSigned by: *Martin C. Horst, PE*  
 DISTRICT ENGINEER



**FAYETTE COUNTY**  
YOAKUM DISTRICT

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT AND LISTED FIELD CHANGES.

AREA ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 2022).

NO EXCEPTIONS  
 RAILROAD: UNION PACIFIC PARALLEL TO FM 154  
 NO EQUATIONS



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24	* WZ (RCD) - 13
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91	RAILROAD SCOPE OF WORK



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN \* HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

*Hayden Morris* 03/22/2023  
 \_\_\_\_\_  
 DESIGN ENGINEER DATE



THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN \*\* HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

*Ryan C. Laurent* 03/22/2023  
 \_\_\_\_\_  
 DESIGN ENGINEER DATE



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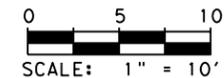


FM 154 AT PIN OAK CREEK

## INDEX OF SHEETS

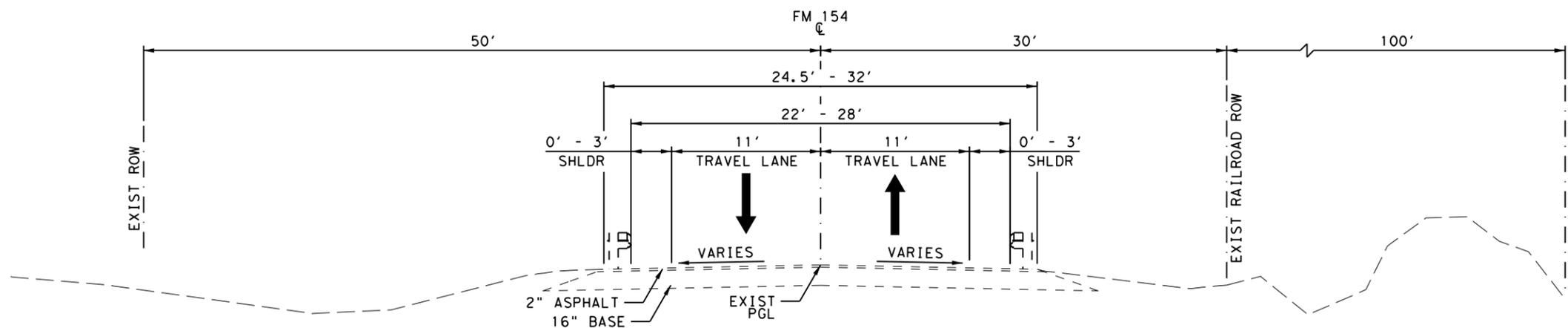
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037

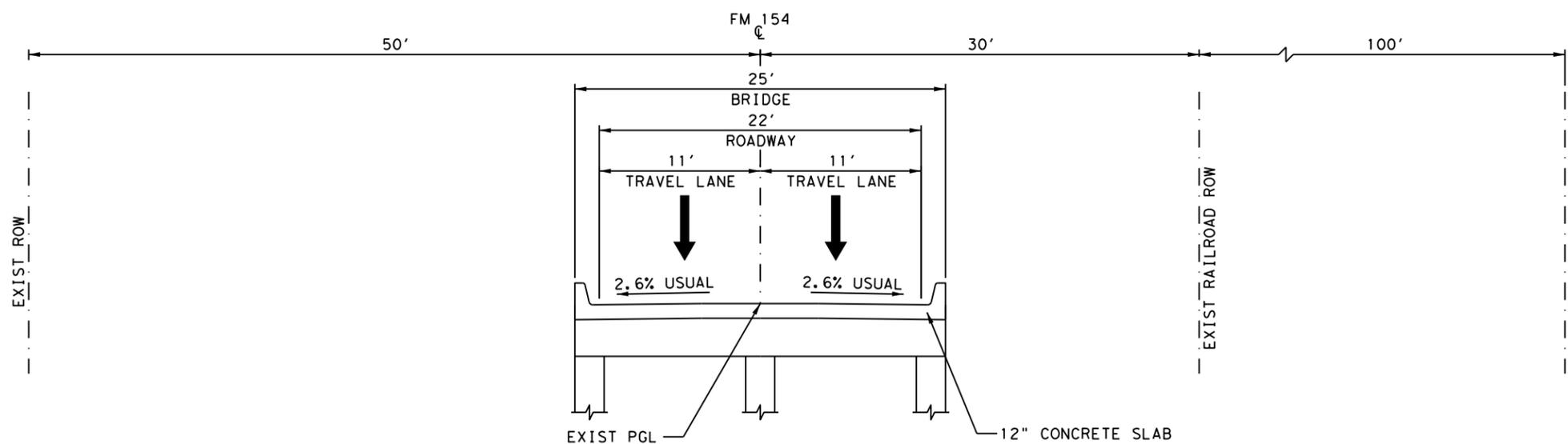


**NOTES:**

1. EXISTING ROW SHOWN IS APPROXIMATE FROM AVAILABLE ROW MAPS AND GIS. IT IS SHOWN FOR INFORMATION ONLY.
2. EXISTING BASE MATERIAL THAT IS EXCAVATED SHALL BE SALVAGED AND REUSED AS EMBANKMENT IN AREAS WHERE FILL IS REQUIRED TO MEET THE PROPOSED PGL. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO ITEMS 110 AND 132.



FM 154  
EXISTING TYPICAL SECTION  
 STA 128+54.00 TO STA 132+65.00  
 STA 133+40.00 TO STA 137+27.00



EXISTING BRIDGE SECTION  
 STA 132+65.00 TO STA 133+40.00

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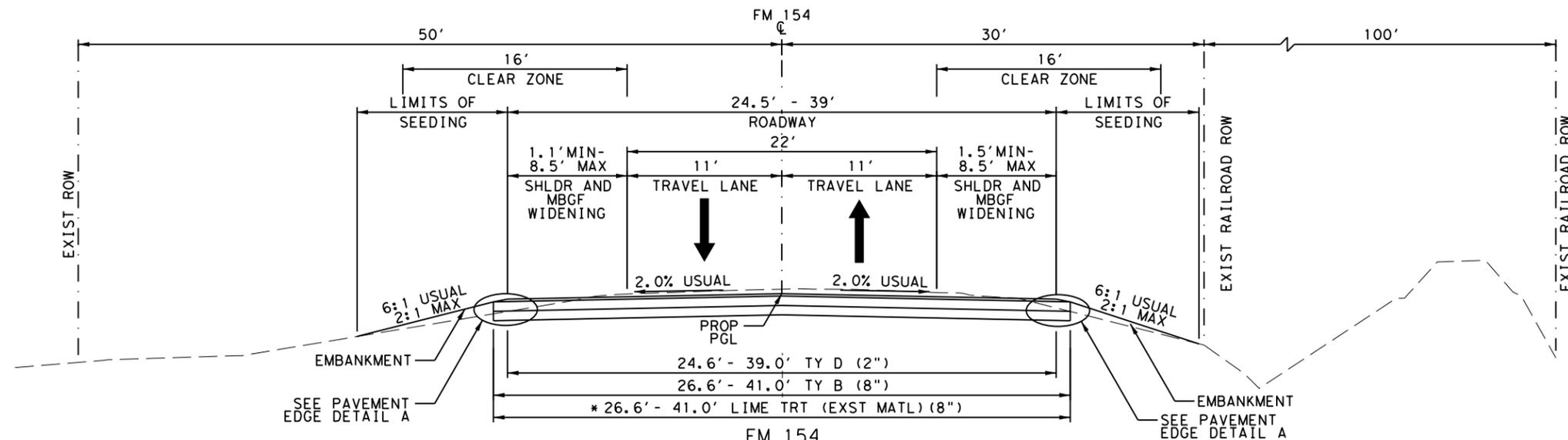
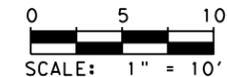


FM 154 AT PIN OAK CREEK

**EXISTING  
 TYPICAL SECTIONS**

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YOAKUM	FAYETTE	3
CONT.	SECT.	JOB	
0334	08	037	



FM 154  
**PROPOSED TYPICAL SECTION**  
 STA 128+54.00 TO STA 130+03.00  
 STA 136+07.00 TO STA 137+27.00

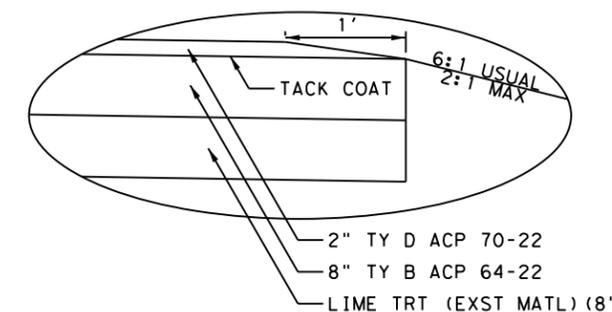
- \* STA 128+54.00 TO STA 131+39.50 - LIME TRT (EXST MATL) (8")
- STA 131+70.00 TO STA 132+00.00 RT - FURNISH AND PLACING TOPSOIL
- STA 132+24.00 TO STA 132+54.00 LT - FURNISH AND PLACING TOPSOIL
- STA 133+56.00 TO STA 133+86.00 LT - FURNISH AND PLACING TOPSOIL
- STA 133+70.00 TO STA 134+00.00 RT - FURNISH AND PLACING TOPSOIL

**NOTES:**

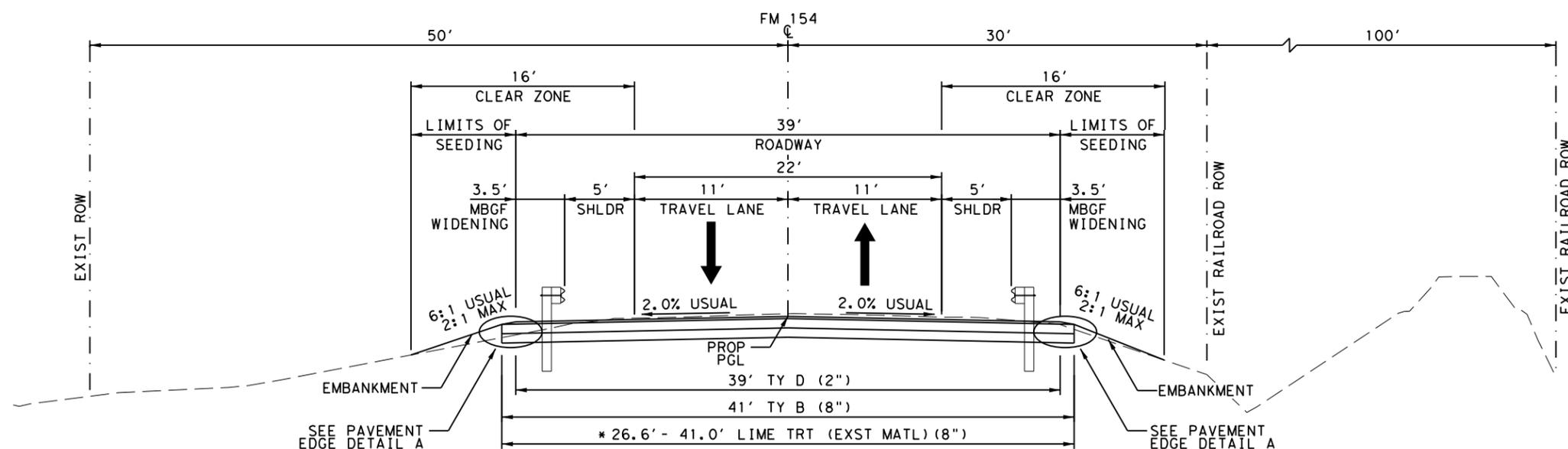
1. EXISTING ROW SHOWN IS APPROXIMATE FROM AVAILABLE ROW MAPS AND GIS. IT IS SHOWN FOR INFORMATION ONLY.
2. EXISTING BASE MATERIAL THAT IS EXCAVATED SHALL BE SALVAGED AND REUSED AS EMBANKMENT IN AREAS WHERE FILL IS REQUIRED TO MEET THE PROPOSED PGL. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO ITEMS 110 AND 132.

**PAVEMENT SURFACING RATES**

ACP	2" TY D ACP 70-22	220 LB/SY
	8" TY B ACP 64-22	880 LB/SY



**PAVEMENT EDGE DETAIL A**



FM 154  
**PROPOSED TYPICAL SECTION**  
 STA 130+03.00 TO STA 132+60.00  
 STA 132+60.00 TO STA 133+50.00 - PROPOSED BRIDGE SECTION  
 STA 133+50.00 TO STA 136+07.00

- \* STA 128+54.00 TO STA 131+39.50 - LIME TRT (EXST MATL) (8")
- STA 131+70.00 TO STA 132+00.00 RT - FURNISH AND PLACING TOPSOIL
- STA 132+24.00 TO STA 132+54.00 LT - FURNISH AND PLACING TOPSOIL
- STA 133+56.00 TO STA 133+86.00 LT - FURNISH AND PLACING TOPSOIL
- STA 133+70.00 TO STA 134+00.00 RT - FURNISH AND PLACING TOPSOIL



03/22/2023

*Hayden Morris*

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

**PROPOSED TYPICAL SECTIONS**

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037

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Project Number:

Sheet: 5

County: Fayette

Control: 0334-08-037

Highway: FM 154

**GENERAL NOTES:**

**GENERAL:**

**There is no railroad crossing on this project. The railroad is parallel to roadway/project. All work, traffic control & equipment shall be outside of railroad right of way.**

The Contractor is to take note that working days will be charged as shown in the plans and not as a "Standard Workweek." See Item 8 below for details.

Provide a minimum two week advance notice to TxDOT prior to closing FM 154.

Contractor questions on this project are to be addressed to the following individual(s):

Covey Morrow IV [Covey.Morrow@txdot.gov](mailto:Covey.Morrow@txdot.gov)  
Chase Hermes [Chase.Hermes@txdot.gov](mailto:Chase.Hermes@txdot.gov)

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:  
<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Project Number:

Sheet: 5

County: Fayette

Control: 0334-08-037

Highway: FM 154

**I. UNION PACIFIC RAILROAD COMPANY**

**PROTECTION OF FIBER OPTIC CABLE SYSTEMS**

Fiber optic cable systems may be buried on the railroad's property. Protection of the fiber optic cable systems is of extreme importance since any break could disrupt service to users resulting in business interruption and loss of revenue and profits. The state and/or its contractor shall telephone the railroad during normal business hours (7:00 a.m. to 9:00 p.m., central time, Monday through Friday, except holidays) at 1-800-336-9193 (also a 24-hour, seven-day number for emergency calls) to determine if fiber optic cable is buried on the railroad's premises to be used by the state. If it is, the state and/or its contractor will telephone the telecommunications company(ies) involved, arrange for a cable locator and make arrangements for relocation or other protection of the fiber optic cable prior to beginning any work on the railroad's premises.

Remove and dispose of existing raised pavement markers as directed. All work involved in the removal and disposal of these markers will not be paid for directly but shall be considered subsidiary to the various bid items involved.

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

Furnish a certified copy of the legal gross weight of each vehicle hauling materials by weight and certified measurements for all trucks hauling material by volume.

Provide temporary pipe drains or culverts and take such other measures as directed to provide for continued drainage from all abutting property, the right of way and the roadway during construction operations. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

**ITEM 2: INSTRUCTIONS TO BIDDERSCONTROL OF THE WORK**

The Contractor is to take note that this project is based off of A+B bid contracting (see Item 2 Article 11.5.2). Incentive/Disincentive provisions will apply to this project as per Special Provision to Item 8 (008---006) for both substantial completion of work and any milestone work. See notes under Item 8 below for the number of working days for the substantial completion of the project and any additional details.

**Project Number:**

**Sheet: 5A**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

#### **ITEM 5: CONTROL OF THE WORK**

Where a precast or cast-in-place concrete bridge element is shown in the plans, Contractor may submit a precast concrete alternate in accordance with “Standard Operating Procedure for Alternate Precast Proposal Submission” found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Department. Contractor is responsible for impacts to the project schedule and cost resulting from the denial or use of alternates.

#### **ITEM 6: CONTROL OF MATERIALS**

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.

<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

#### **SPECIAL PROVISION TO ITEM 6:**

As reported by Burcham Environmental Services, L.L.C. in the NESHAP Asbestos /Lead Inspection Report dated December 28, 2021, the grey paint on the steel piling has a lead content ranging from 3.1% to 4.4%.

If the Contractor determines that saw or flame cutting of the steel pile is necessary to facilitate their removal, the Contractor shall excavate the material surrounding the steel pile down to the pile cut off depth. The excavation shall be adequate to allow the Engineer to verify the presence of paint. The Contractor may have to de-water the excavated area. The material used for de-watering shall be a non-erodible material. If the stream is flowing, near normal flow shall be maintained.

Labor, equipment and materials needed to provide excavation or dewatering for the paint investigation or removal process will not be paid for directly, but will be considered subsidiary to Item 496 “Removing Structures”.

**Project Number:**

**Sheet: 5A**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

#### **ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES**

The Contractor’s attention is directed to the fact that discharge of permanent or temporary fill material into the waters of the United States (U.S.) including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

The Department will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and its potential to affect USACE jurisdictional areas. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. The Department will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits of this permit(s), then it becomes the Contractor’s entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by the Department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The Contractor shall maintain near normal flow of any jurisdictional waters of the U.S. at all times during construction. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the TXDOT Yoakum District Environmental Coordinator.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

If the contractor proposes work beyond the TxDOT obtained permit limitations, the contractor is responsible for additional costs, delays, and obtaining new or revised permits prior to construction.

All temporary construction access work and materials will not be measured or paid for directly but will be subsidiary to pertinent items. Prior to the scheduling of a Pre-Construction Meeting, submit a Temporary Construction Access Plan to the Area Engineer and to District Environmental Staff for their approval. The Construction Plan should contain a description of the equipment, such as barges, structures, etc., which may occupy waters of the US including jurisdictional wetlands, and a detailed work schedule. No work of any kind will be allowed until the pre-construction meeting has been held.

Project Number:

Sheet: 5B

County: Fayette

Control: 0334-08-037

Highway: FM 154

Temporary construction waterway crossings have been environmental cleared/permitted within Right of Way. Restrict construction operations in any water body to the necessary areas as shown on the plans or applicable permit, or as directed. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for stream crossings. All temporary construction access materials shall be completely removed as soon as possible once temporary access is no longer required and affected areas shall be returned to preconstruction elevations and contours and revegetated in accordance with the SW3P. All work must comply with the General Conditions of the appropriate USACE permit.

#### ITEM 8: PROSECUTION AND PROGRESS

Working days will be computed and charged in accordance with Article 8.3.1.2 Six-Day Workweek.

##### A+B Bidding

The maximum number of days that will be accepted as a responsive bid for substantial completion shall be 155 working days.

Time charges for the purpose of credits/penalties related to A+B bidding will be computed and charged as specified in the plans. See Item 8 notes for details.

Substantial completion is defined as when FM 154 is open to traffic in the final lane configuration and final pavement markings have been placed.

The daily road user cost liquidated damages for substantial completion of the project is \$4,808 per day, which will be assessed/penalized per day if the project is not completed within the number of days bid for substantial completion.

The Contractor will receive a credit in the amount of \$4,808 per day for substantially completing the project in less than the number of days bid. The maximum number of days for computing the incentive credit is 10 days. The maximum amount of incentive is \$48,080.

The number of working days for project completion and final cleanup will be an additional 5 working days after the substantial complete date of this project. The normal liquidated damage rate based on contract administration costs will be assessed if the project is not completed within this timeframe.

The Department will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

Project Number:

Sheet: 5B

County: Fayette

Control: 0334-08-037

Highway: FM 154

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Provide progress schedule as a Bar Chart.

#### ITEM 100: PREPARING RIGHT-OF-WAY

Dispose of trees from the right-of-way within 24 hours of removal.

#### ITEM 110: EXCAVATION

Remove existing vegetation, including roots and topsoil, within the grading limits to a depth of approximately 2 inches immediately before grading operations begin within any section. Place the material in a windrow on each side of the roadbed, and replace as directed on the completed slopes as soon as practicable. Measurement and payment will be in accordance with Item "Excavation" for cut sections. All topsoil excavation and the work involved in replacing the topsoil will not be paid for directly but will be subsidiary to the pertinent items for fill sections.

#### ITEMS 110 & 132: EXCAVATION AND EMBANKMENT

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation", as directed.

#### ITEM 150: BLADING

Sprinkling and rolling which may be required during the operation of Item 150 will not be measured or paid for directly, but will be considered subsidiary to this item.

#### ITEM 260: LIME TREATMENT (ROAD MIXED)

Pulverize the existing bituminous surface so that 100% of the material passes a 2 inch sieve and incorporate it into the lime treated salvage base course. This work will not be paid for directly but will be subsidiary to this item.

**Project Number:**

**Sheet: 5C**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

**ITEM 320: EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT**

Provide a material transfer device capable of transferring mix from the haul trucks to the paver. Monitor its loading such that no damage is done to the existing pavement structures if a material transfer vehicle is used.

Securely attach a waterproof tarpaulin to the top of all trucks hauling ACP, to prevent air flow across the mix, for the duration of all ACP operations.

**ITEM 400: EXCAVATION AND BACKFILL FOR STRUCTURES**

Flexible base (Ty D) may be used for cement stabilized backfill aggregate, as approved.

**ITEM 427: SURFACE FINISHES FOR CONCRETE**

Provide Surface Area II, railing, and culvert headwalls and wingwalls with a Slurry Coat Finish per 427.4.3.2 for cast-in-place concrete surfaces.

**ITEM 432: RIPRAP**

The dimension as shown in the stone protection bid item description is the stone size as described in the specification. The required thickness will be as shown elsewhere in the plans.

Broken concrete removed under this contract may be used for the common stone riprap item.

**ITEM 496: REMOVING STRUCTURES**

Material removed under this item will not be deemed salvageable.

The removal of the existing concrete riprap or stone riprap protecting the existing bridge, is subsidiary to Item 496 Removing Structures, except as shown in the plans. .

**Project Number:**

**Sheet: 5C**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

**ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING**

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

No additional payment will be made for relocating existing sign assemblies to temporary mounts.

Signs warning of temporary conditions, such as "NO CENTER LINE," "LOOSE GRAVEL," etc., shall only be displayed when conditions are present. Remove or completely cover signs that do not apply to the roadway conditions. These signs may be installed prior to beginning work but shall remain completely covered until the signs are applicable.

In accordance with Article 502.4.2, no payment will be made for the month if the contractor fails to provide or properly maintain signs in compliance with the contract requirements. Temporary warning signs that are visible when conditions do not apply will be considered improper maintenance of signs.

**ITEM 504: FIELD OFFICE AND LABORATORY**

Provide a Type D structure for the asphalt mix control laboratory for the engineer's exclusive use. Equip the structure with a 240 volt electrical entrance service. The service will consist of a minimum of four 120 volt circuits with 20 amp breakers and at most two grounded convenience outlets per circuit and provisions for a minimum of two 220 volt ovens. Space heaters for heating the structure are unacceptable. Portable structures will be support blocked for stability and will be tied down.

**ITEM 506: TEMPORARY EROSION, SEDIMENTATION,  
AND ENVIRONMENTAL CONTROLS**

1. See SWP3 plan sheet for total disturbed acreage.

**Project Number:**

**Sheet: 5D**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.

3. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans.

4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).

5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.

6. Provide a signed sketch detailing the location of any contractor's PSLs on ROW or within one (1) mile of the project.

**ITEM 540: METAL BEAM GUARD FENCE**

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

**ITEMS 540 & 544: METAL BEAM GUARD FENCE AND  
GUARDRAIL END TREATMENTS**

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

**ITEM 3076: DENSE-GRADED HOT-MIX ASPHALT**

Tie HMA CP tapers to a vertical transition joint created by the milling operation at the beginning and ending transitions and at all exceptions, or as directed. Provide a temporary HMA CP taper at vertical joints until overlay operations begin. Milling and HMA CP work will not be paid for directly but will be considered subsidiary to this item.

Mixture designs, using the PG binder originally specified and without additives, failing to meet the requirements of Table 10 will require the addition of a minimum 1.0% of Type A hydrated lime based on dry weight of the total aggregate.

Use of RAS in the HMA CP surface course is not permitted.

**Project Number:**

**Sheet: 5D**

**County: Fayette**

**Control: 0334-08-037**

**Highway: FM 154**

Do not add additional quantity of RAP to stockpiles tested and approved. If additional RAP is added to a stockpile, a new design and trial batch will be required prior to placement on the roadway.

The extracted aggregate from contractor-owned RAP shall have a minimum of 85% two crushed faces when tested in accordance with TEX-460-A, Part I.

Limit uneven pavement to two days production with the requirement that all longitudinal joints adjacent to a travelway are constructed with a joint maker providing a maximum one inch vertical edge (1/2" desirable) with an adjacent 6:1 taper.

**ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN**

Provide Portable Changeable Message Signs (PCMS) for the duration of the project. Locations and messages or other miscellaneous uses of PCMS, shall be as approved or directed by the Engineer.

**ITEM 6185: TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER  
ATTENUATOR (TA)**

Shadow vehicle(s) with TMA are set up for stationary and/or mobile operations. The contractor will be responsible for determining if operations will be ongoing at the same time to determine the total number of TMAs needed for the project.



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0334-08-037

DISTRICT Yoakum  
HIGHWAY FM 154

COUNTY Fayette

CONTROL SECTION JOB				0334-08-037		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00134788			
COUNTY				Fayette			
HIGHWAY				FM 154			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-6002	PREPARING ROW	STA	10.000		10.000	
	105-6037	REMOVING STAB BASE AND ASPH PAV(0"-16")	SY	2,277.000		2,277.000	
	110-6001	EXCAVATION (ROADWAY)	CY	813.000		813.000	
	110-6002	EXCAVATION (CHANNEL)	CY	411.000		411.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	361.000		361.000	
	150-6002	BLADING	HR	10.000		10.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	203.000		203.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	SY	4,347.000		4,347.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)	SY	1,088.000		1,088.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)	SY	1,088.000		1,088.000	
	168-6001	VEGETATIVE WATERING	MG	36.600		36.600	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	174.000		174.000	
	169-6002	SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	116.000		116.000	
	169-6003	SOIL RETENTION BLANKETS (CL 1) (TY C)	SY	333.000		333.000	
	260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	29.000		29.000	
	260-6027	LIME TRT (EXST MATL)(8")	SY	1,182.000		1,182.000	
	400-6005	CEM STABIL BKFL	CY	42.000		42.000	
	416-6002	DRILL SHAFT (24 IN)	LF	296.000		296.000	
	420-6013	CL C CONC (ABUT)	CY	24.400		24.400	
	420-6029	CL C CONC (CAP)	CY	11.300		11.300	
	420-6037	CL C CONC (COLUMN)	CY	3.800		3.800	
	422-6001	REINF CONC SLAB	SF	3,071.000		3,071.000	
	425-6011	PRESTR CONC SLAB BEAM (4SB15)	LF	534.000		534.000	
	425-6012	PRESTR CONC SLAB BEAM (5SB15)	LF	178.000		178.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	996.000		996.000	
	450-6006	RAIL (TY T223)	LF	204.000		204.000	
	454-6004	ARMOR JOINT (SEALED)	LF	67.000		67.000	
	496-6009	REMOV STR (BRIDGE 0 - 99 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7.000		7.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	50.000		50.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	50.000		50.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,123.000		1,123.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,123.000		1,123.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	550.000		550.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	557.000		557.000	

DISTRICT	COUNTY	CCSJ	SHEET
Yoakum	Fayette	0334-08-037	6



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0334-08-037

DISTRICT Yoakum

COUNTY Fayette

HIGHWAY FM 154

CONTROL SECTION JOB				0334-08-037		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00134788			
COUNTY				Fayette			
HIGHWAY				FM 154			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	658-6073	INSTL OM ASSM (OM-2Y)(WC)GND(BI)	EA	12.000		12.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	12.000		12.000	
	3076-6001	D-GR HMA TY-B PG64-22	TON	1,479.000		1,479.000	
	3076-6042	D-GR HMA TY-D SAC-B PG70-22	TON	351.000		351.000	
	3076-6066	TACK COAT	GAL	673.000		673.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6439-6008	HPPM-RIB W/RET REQ TYI(W)6"(SLD)100MIL	LF	1,746.000		1,746.000	
	6439-6014	HPPM-RIB W/RET REQ TYI(Y)6"(BRK)100MIL	LF	219.000		219.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

**TCP SUMMARY**

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS	
DESCRIPTION	6001
	PORTABLE CHANGEABLE MESSAGE SIGN
	EA
1	2
TOTAL	2

**ROADWAY SUMMARY**

SUMMARY OF ROADWAY ITEMS									
SHEET NO.	STATION	100	260	260	342	432	3076	3076	
		PREPARING ROW	LIME (HYD, COM OR QK) (SLRY) OR QK (DRY) 160 LB/CF @5%	LIME TRT (EXST MATL) (8")	TACK COAT 0.20 GAL/SY	RIPRAP (STONE PROTECTION) (18 IN)	D-GR HMA TY-D SAC-B PG70-22 220 # / SY	D-GR HMA TY-B PG64-22 880 # / SY	
FM 154		STA	TON	SY	GAL	CY	TON	TON	
1 OF 2	128+54 TO 133+00	5	29	1182	345	87	180	759	
2 OF 2	133+00 TO 137+27	5			328	567	171	720	
TOTAL		10	29	1182	673	654	351	1479	

**METAL BEAM GUARD FENCE SUMMARY**

SUMMARY OF METAL BEAM GUARDFENCE ITEMS						
SHEET NO.	STATION	540		542	544	
		MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)
FM 154		LF	EA	LF	EA	EA
1 OF 2	128+54 TO 133+00	275	2	277	2	2
2 OF 2	133+00 TO 136+55	275	2	279	2	2
TOTAL		550	4	557	4	4

**REMOVAL SUMMARY**

SUMMARY OF REMOVAL ITEMS			
SHEET NO.	STATION	105	496
		REMOVING STAB BASE AND ASPH PAV (0"-16")	REMOV STR (BRIDGE 0 - 99 FT LENGTH)
FM 154		SY	EA
1 OF 2	128+54 TO 133+00	1113	
2 OF 2	133+00 TO 137+27	1164	
TOTAL		2277	1

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FED. RD. DIV. NO. 6 FEDERAL AID PROJECT NO. HIGHWAY NO. FM 154

STATE TEXAS DIST. YOAKUM COUNTY FAYETTE SHEET NO. 7

CONT. 0334 SECT. 08 JOB 037

QUANTITY SUMMARY

SHEET 1 OF 3

**EARTHWORK SUMMARY**

SUMMARY OF EARTHWORK ITEMS					
STATION	110	132	110	132	110
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	EXCAVATION (CHANNEL)
FM 154	CY	CY	ACCUMULATIVE TOTALS		CY
128+54 TO 129+00	50	1	50	1	
129+00 TO 129+50	71	2	121	3	
129+50 TO 130+00	78	6	199	9	
130+00 TO 130+50	78	11	277	20	
130+50 TO 131+00	72	18	349	38	
131+00 TO 131+50	59	27	408	65	
131+50 TO 132+00	37	39	445	104	
132+00 TO 132+50	19	83	464	187	
132+50 TO 132+60	7	13	471	200	
132+60 TO 133+00	Bridge Section		471	200	163
133+00 TO 133+50			471	200	248
133+50 TO 134+00	33	25	504	225	
134+00 TO 134+50	38	38	542	263	
134+50 TO 135+00	47	27	589	290	
135+00 TO 135+50	53	22	642	312	
135+50 TO 136+00	54	22	696	334	
136+00 TO 136+50	48	18	744	352	
136+50 TO 137+00	44	8	788	360	
137+00 TO 137+27	25	1	813	361	
<b>TOTAL</b>	<b>813</b>	<b>361</b>			<b>411</b>

**PAVEMENT MARKINGS SUMMARY**

SUMMARY OF SIGNING ITEMS		
SHEET NO.	STATION	658
		INSTL OM ASSM (OM-2Y) (WC) GND (BI)
FM 154		EA
1 OF 2	128+54 TO 133+00	6
2 OF 2	133+00 TO 137+27	6
<b>TOTAL</b>		<b>12</b>

SUMMARY OF PAVEMENT MARKING ITEMS				
SHEET NO.	STATION	672	6439	6439
		REFL PAV MRKR TY II-A-A	HPPM-RIB W/RET REQ TYI (W) 6" (SLD) 100MIL	HPPM-RIB W/RET REQ TYI (Y) 6" (BRK) 100MIL
FM 154		EA	LF	LF
1 OF 2	128+54 TO 133+00	6	892	112
2 OF 2	133+00 TO 137+27	6	854	107
<b>TOTAL</b>		<b>12</b>	<b>1746</b>	<b>219</b>

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FM 154 AT PIN OAK CREEK

## QUANTITY SUMMARY

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037

**EROSION CONTROL SUMMARY**

SHEET NO.		STATION		150	160	164			166*	168	169			506			
				BLADING	FURNISHING AND PLACING TOPSOIL (4")	CELL FBR MLCH SEED (PERM) (RURAL) (CLAY)	CELL FBR MLCH SEED (TEMP) (WARM)	CELL FBR MLCH SEED (TEMP) (COOL)	FERTILIZER	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	SOIL RETENTION BLANKETS (CL 1) (TY B)	SOIL RETENTION BLANKETS (CL 1) (TY C)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
		FM 154		HR	SY	SY	SY	SY	TON	MG	SY	SY	SY	LF	LF	LF	LF
1	OF 2	128+54	TO 133+00		117	2110	528	528	0.11	17.8	174		333			582	582
2	OF 2	133+00	TO 137+27		86	2237	560	560	0.12	18.8		116			541	541	
TOTAL				10	203	4347	1088	1088	0.23	36.6	174	116	333	50	50	1123	1123

\* FOR CONTRACTOR'S INFORMATION ONLY

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**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

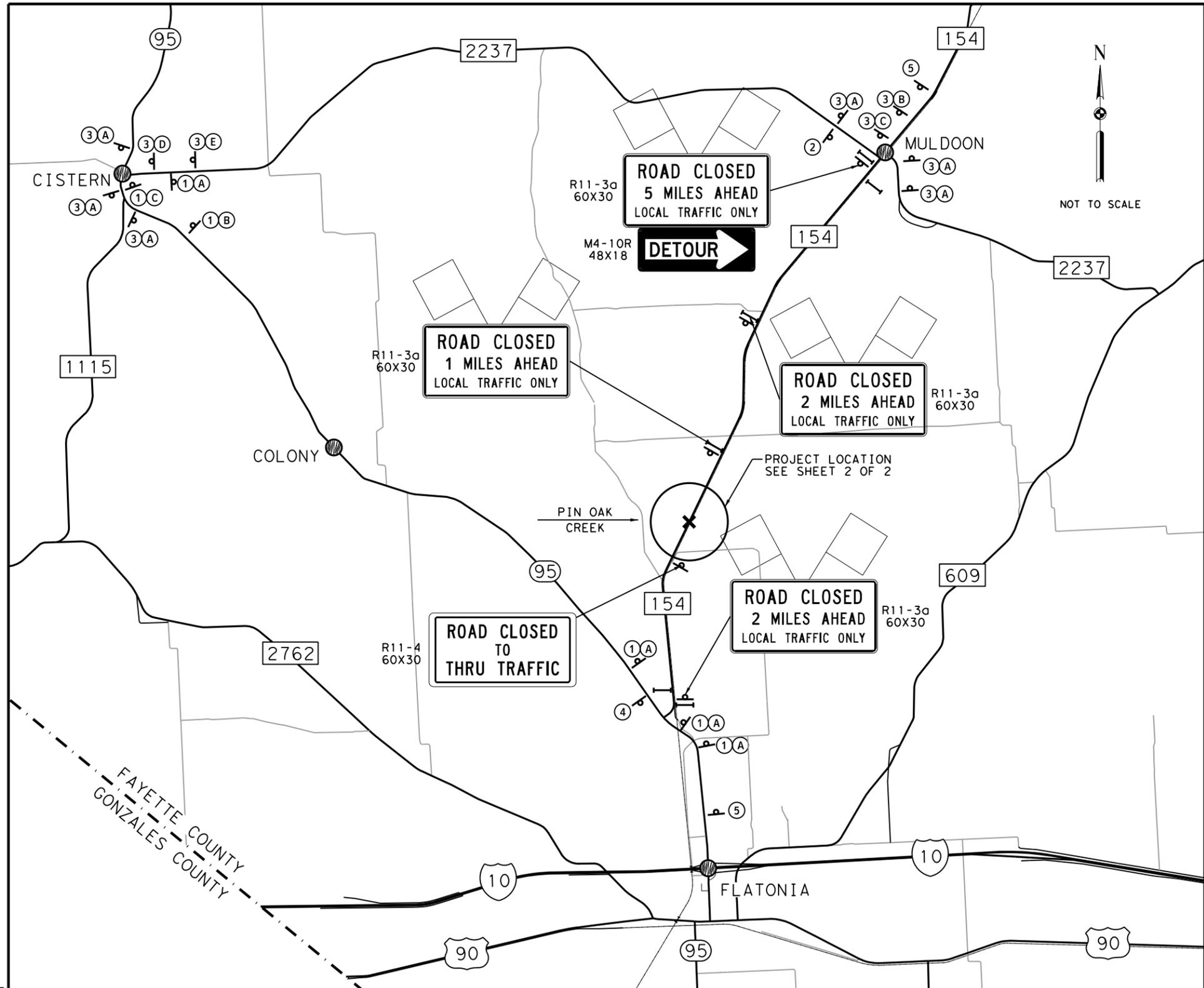
**QUANTITY SUMMARY**

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037

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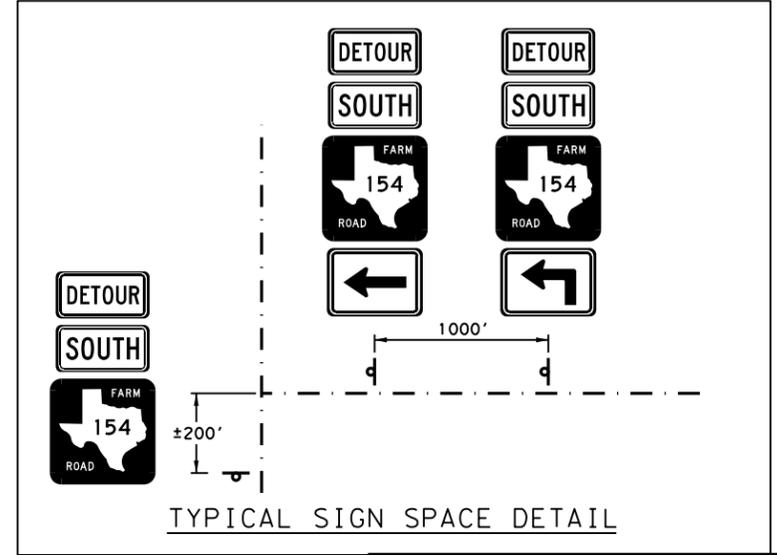


**LEGEND**

- SIGN
- TYPE 3 BARRICADE
- CITY LOCATION

**GENERAL NOTES:**

1. FM 154 WILL BE CLOSED TO THROUGH TRAFFIC DURING CONSTRUCTION OF PROJECT.
2. ALL DETOUR SIGNS SHALL BE COVERED WHEN THE ROAD IS OPENED TO THROUGH TRAFFIC.
3. PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS) SHALL BE PLACED SEVEN (7) DAYS IN ADVANCE OF ACTUAL ROADWAY CLOSURE (SEE GENERAL NOTES, ITEM 6001).
4. ALL ITEMS AND WORK RELATED TO THE ROAD CLOSURE DETOUR ARE SUBSIDIARY TO THE BARRICADES, SIGNS AND TRAFFIC HANDLING ITEM UNLESS OTHERWISE NOTED.
5. SEE WZ(RCD)-13 STANDARD FOR ADDITIONAL DETAILS.
6. SEE CURRENT BC STANDARDS FOR SIGN SPACINGS AND OTHER DIMENSIONS.



*Hayden Morris*

03/22/2023

**Kimley»Horn** F-928

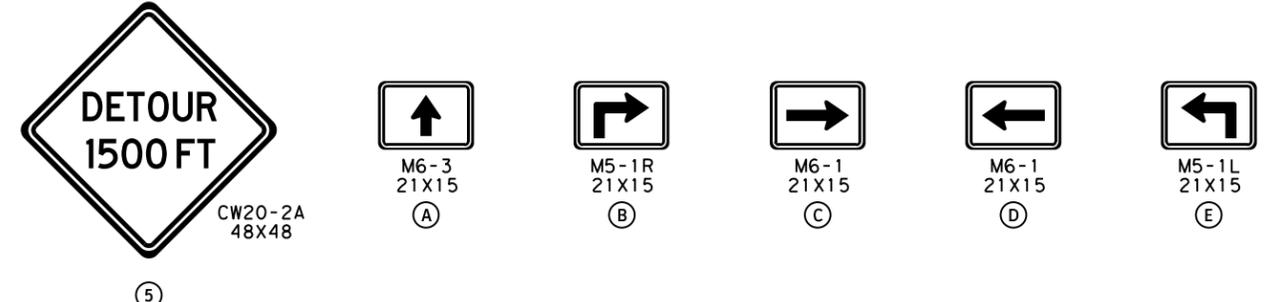
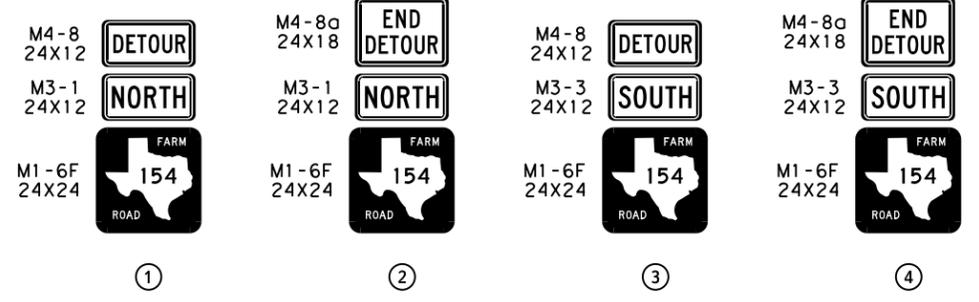


FM 154 AT PIN OAK CREEK

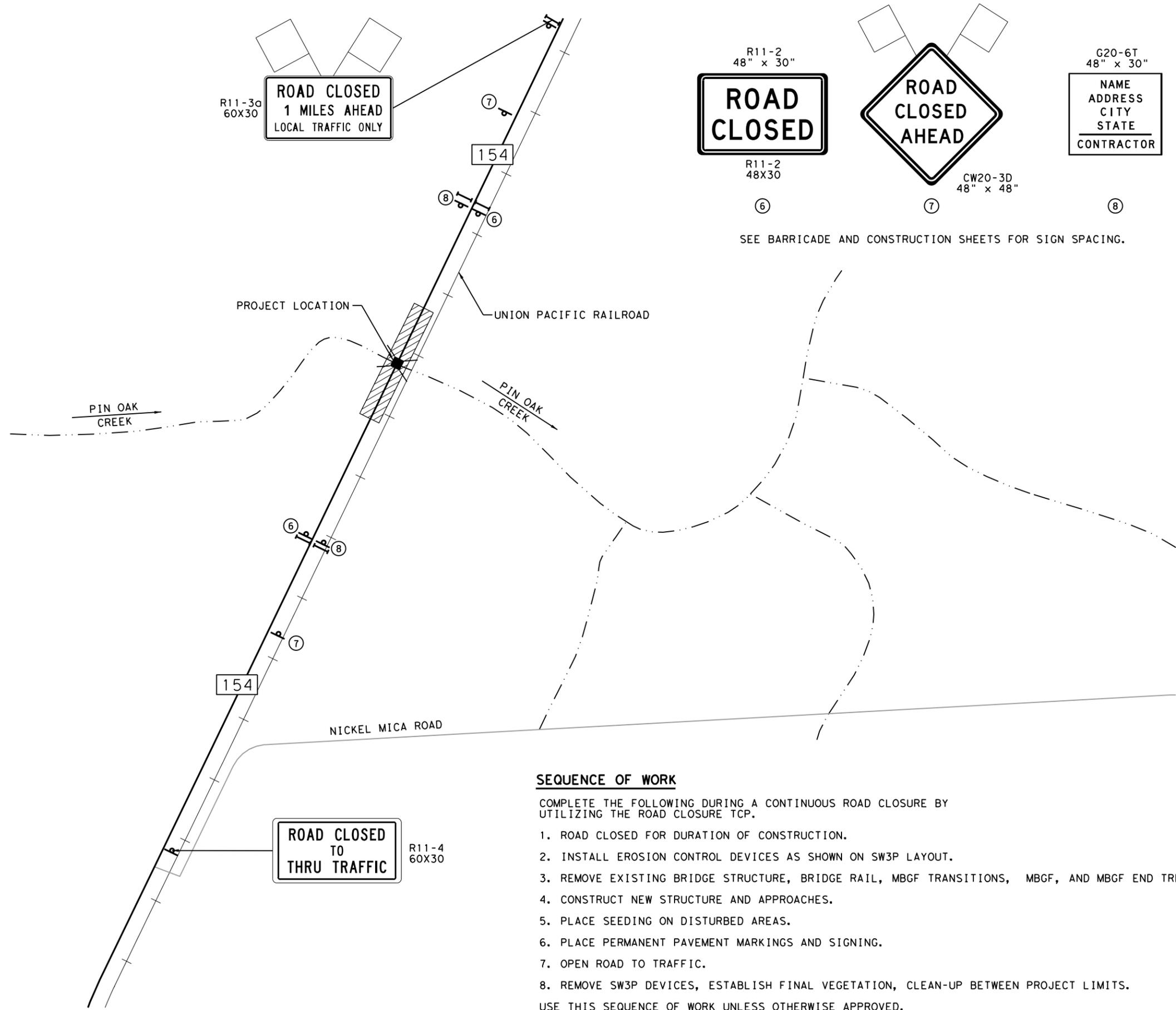
**TRAFFIC CONTROL PLAN**

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		10



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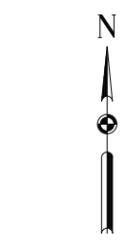
SEE BARRICADE AND CONSTRUCTION SHEETS FOR SIGN SPACING.

**SEQUENCE OF WORK**

COMPLETE THE FOLLOWING DURING A CONTINUOUS ROAD CLOSURE BY UTILIZING THE ROAD CLOSURE TCP.

1. ROAD CLOSED FOR DURATION OF CONSTRUCTION.
2. INSTALL EROSION CONTROL DEVICES AS SHOWN ON SW3P LAYOUT.
3. REMOVE EXISTING BRIDGE STRUCTURE, BRIDGE RAIL, MBGF TRANSITIONS, MBGF, AND MBGF END TREATMENTS.
4. CONSTRUCT NEW STRUCTURE AND APPROACHES.
5. PLACE SEEDING ON DISTURBED AREAS.
6. PLACE PERMANENT PAVEMENT MARKINGS AND SIGNING.
7. OPEN ROAD TO TRAFFIC.
8. REMOVE SW3P DEVICES, ESTABLISH FINAL VEGETATION, CLEAN-UP BETWEEN PROJECT LIMITS.

USE THIS SEQUENCE OF WORK UNLESS OTHERWISE APPROVED.



NOT TO SCALE

**LEGEND**

- SIGN
- TYPE 3 BARRICADE



03/22/2023



FM 154 AT PIN OAK CREEK

**TRAFFIC CONTROL PLAN**

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YOAKUM	FAYETTE	11
CONT.	SECT.	JOB	
0334	08	037	

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**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
12. The Engineer has the final decision on the location of all traffic control devices.
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

**WORKER SAFETY NOTES:**

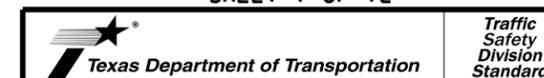
1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.
2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

<b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b> <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12



**BARRICADE AND CONSTRUCTION  
GENERAL NOTES  
AND REQUIREMENTS**

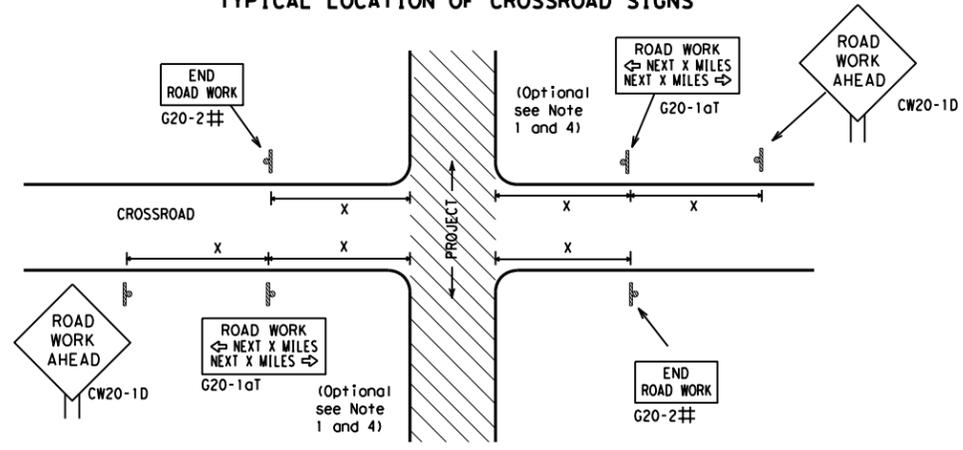
**BC (1) - 21**

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
4-03	7-13	0334	08	037	FM 154				
9-07	8-14	DIST	COUNTY		SHEET NO.				
5-10	5-21	YKM	FAYETTE		12				

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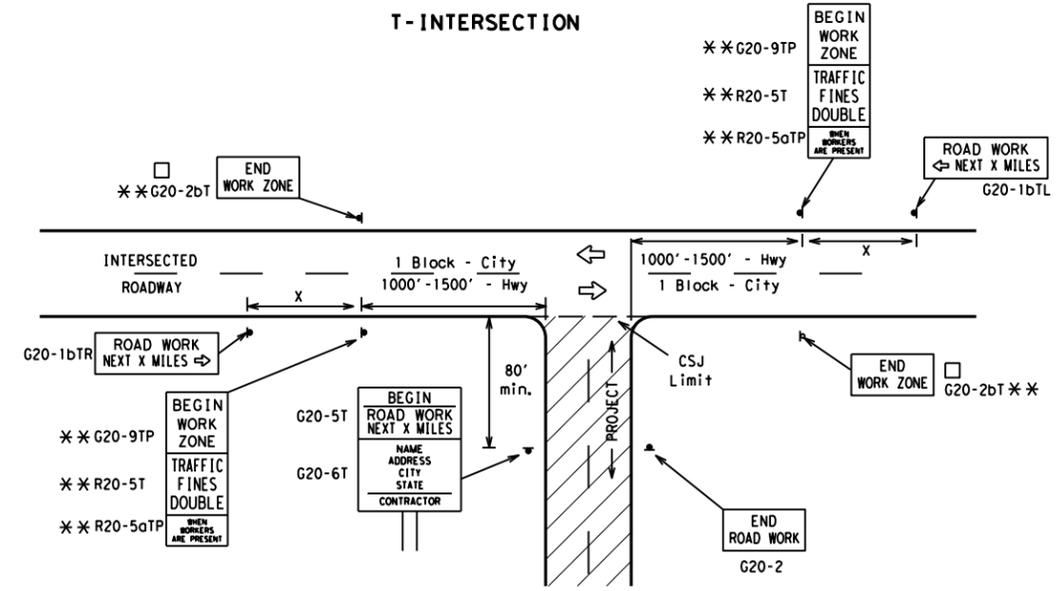
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
  - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
  - Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
  - The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
  - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
  - When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

- The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	* <sup>3</sup>

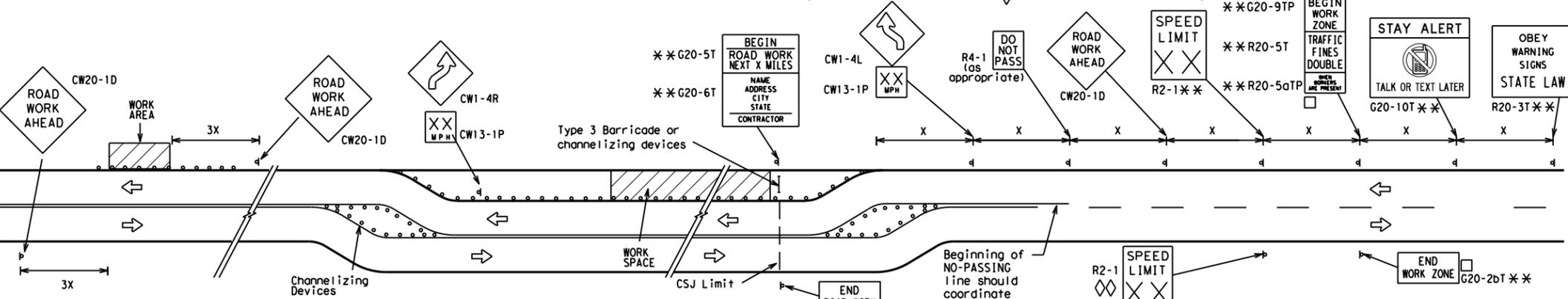
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

Δ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

**GENERAL NOTES**

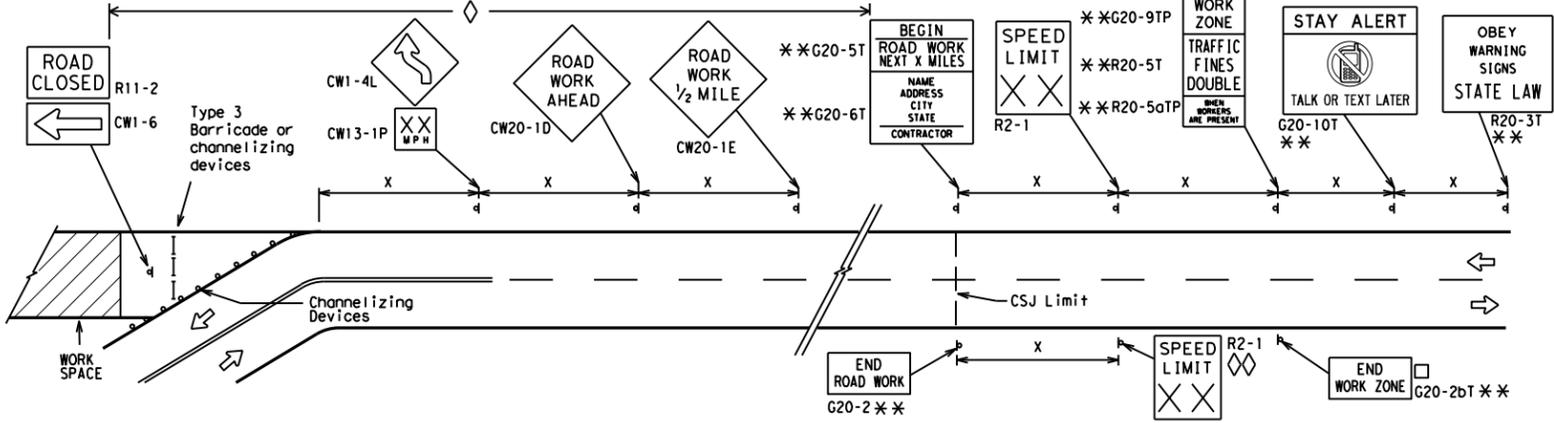
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
- Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**

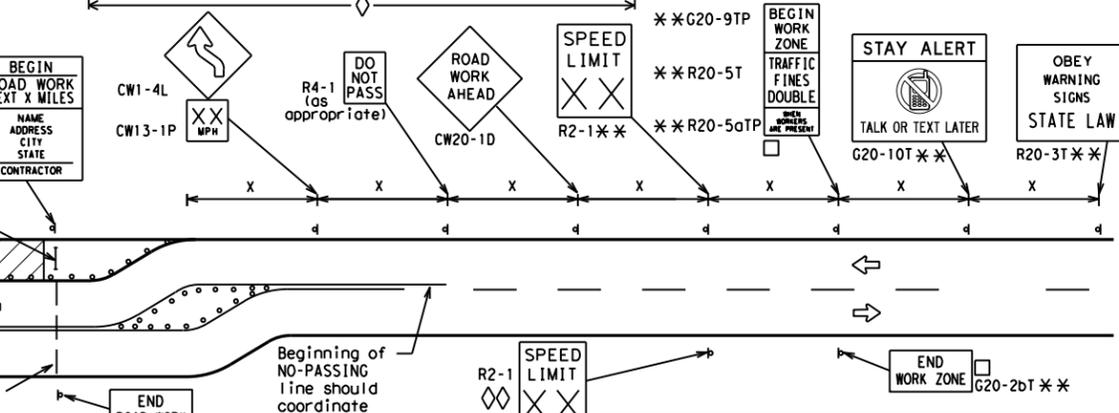


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS**



**SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS**



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
  - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
  - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
  - Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
—	Type 3 Barricade
○ ○ ○	Channelizing Devices
■	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

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Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

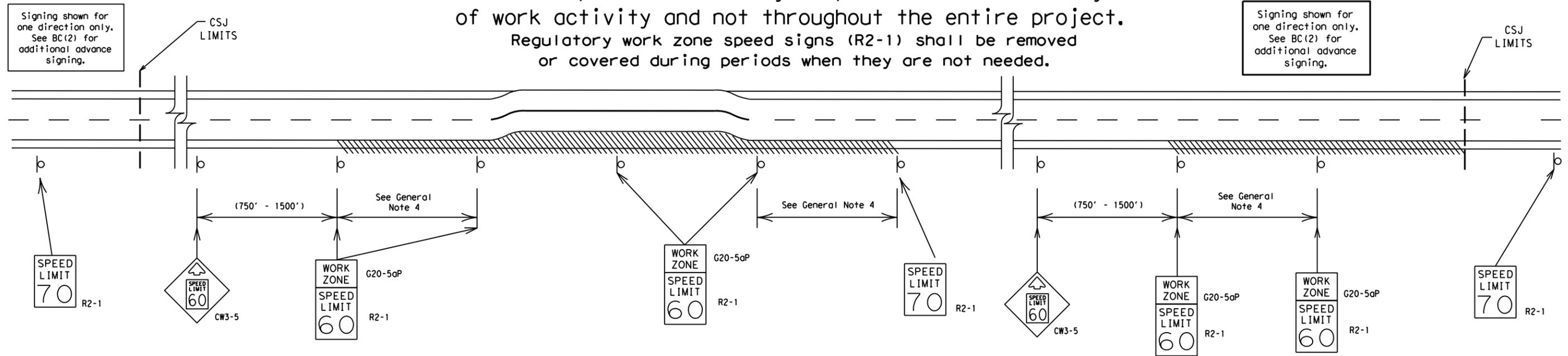
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7-13 5-21	YKM	FAYETTE	13	

# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

### SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

### GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
 

40 mph and greater	0.2 to 2 miles
35 mph and less	0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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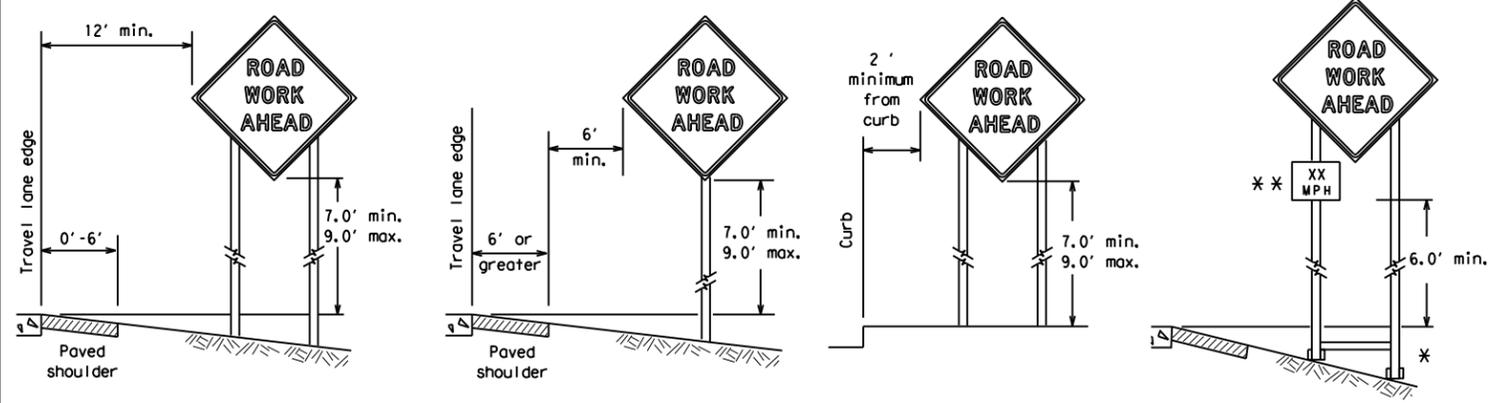
## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

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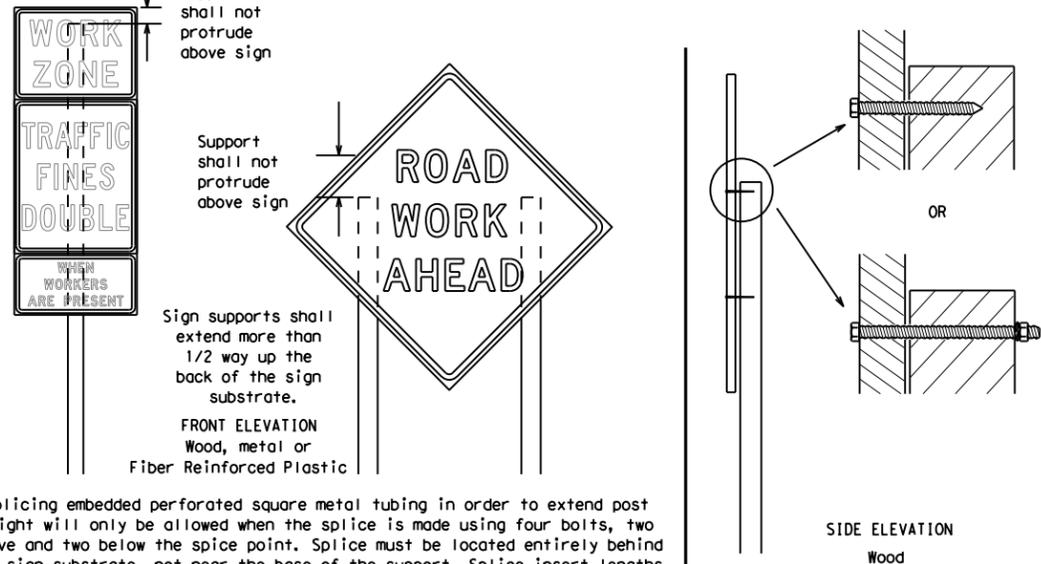
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

\*\* When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

**ATTACHMENT FOR SIGN SUPPORTS**



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

**GENERAL NOTES FOR WORK ZONE SIGNS**

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

**DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)**

- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
  - Long-term stationary - work that occupies a location more than 3 days.
  - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

**SIZE OF SIGNS**

- The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

**SIGN SUBSTRATES**

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

**REFLECTIVE SHEETING**

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, shall be used for rigid signs with orange backgrounds.

**SIGN LETTERS**

- All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

**REMOVING OR COVERING**

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

**SIGN SUPPORT WEIGHTS**

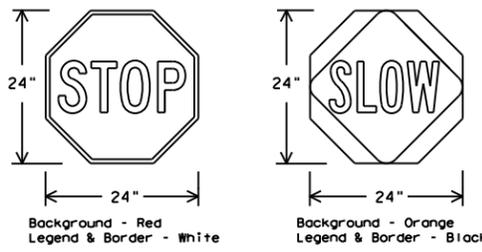
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

**FLAGS ON SIGNS**

- Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

**STOP/SLOW PADDLES**

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.



**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

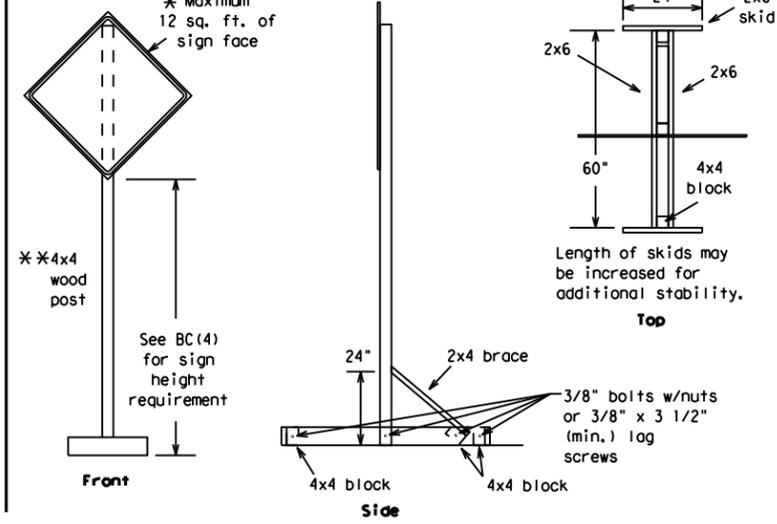
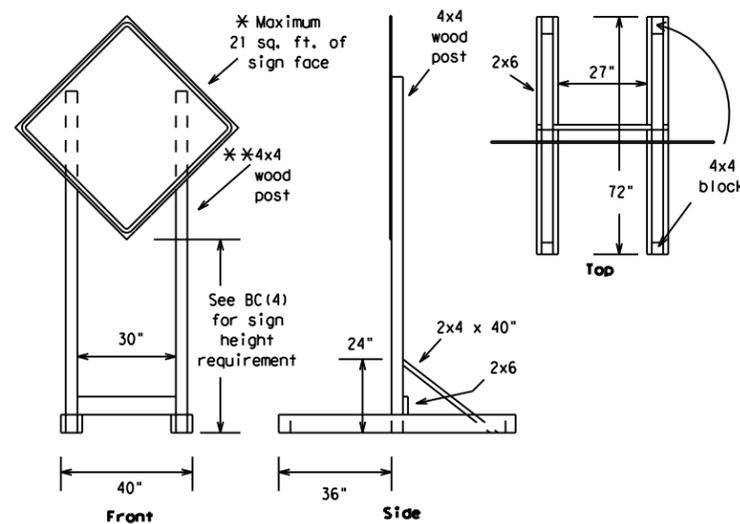
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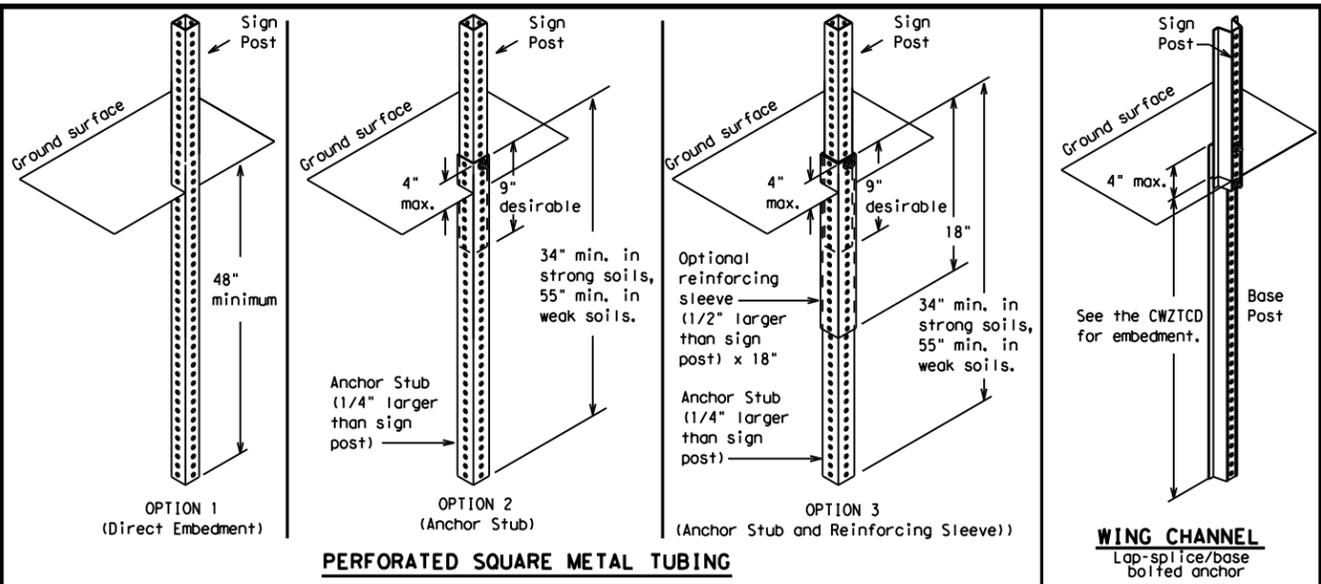
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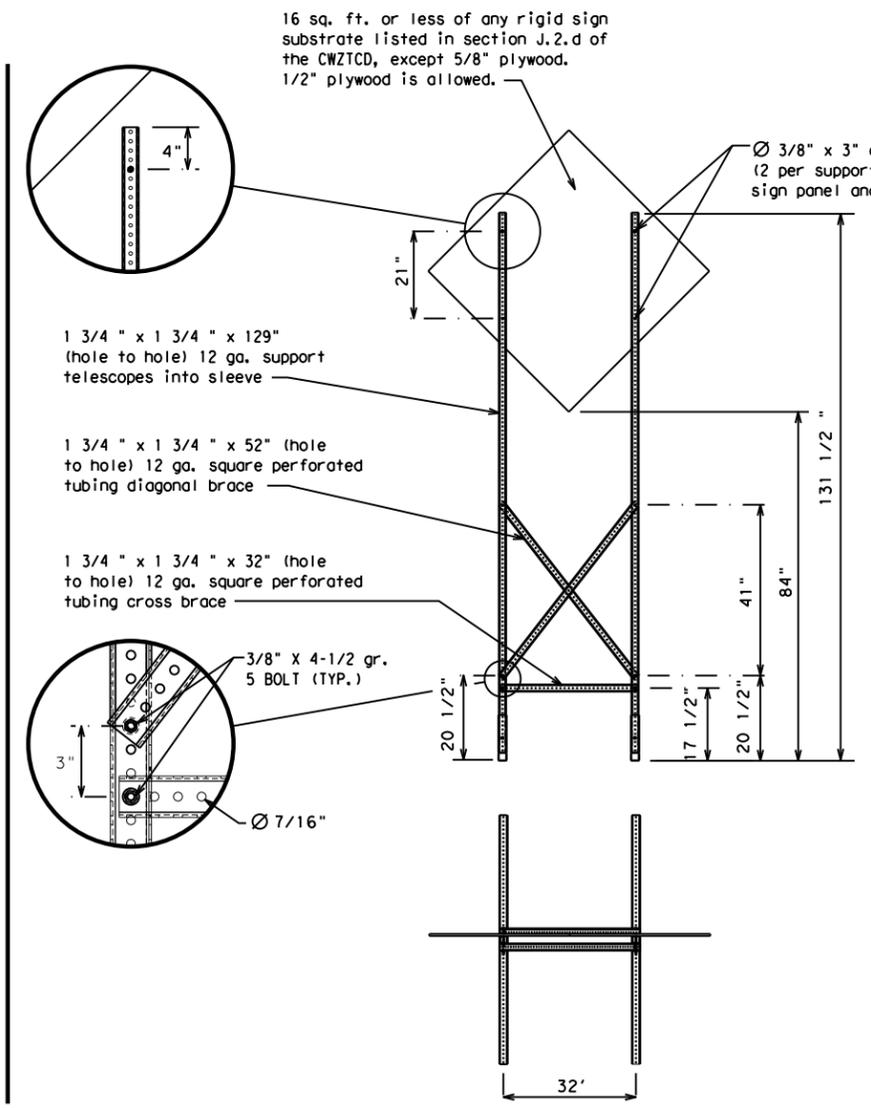
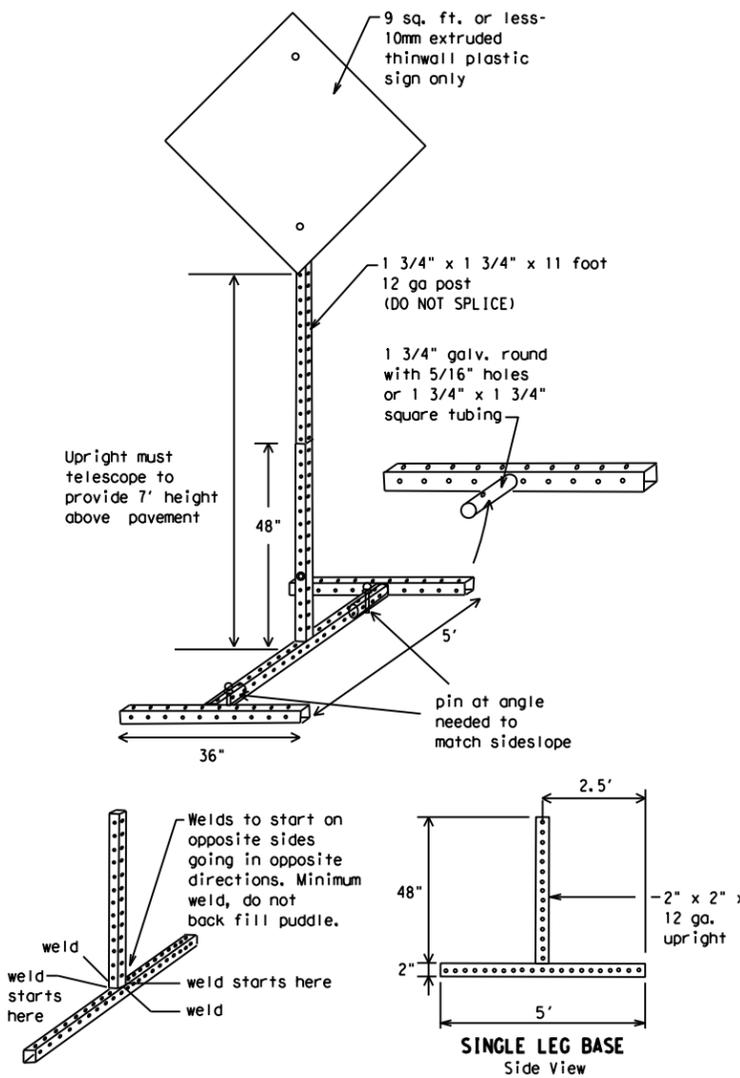
**SKID MOUNTED WOOD SIGN SUPPORTS**

\* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



**GROUND MOUNTED SIGN SUPPORTS**

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



**SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS**

\* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

**WEDGE ANCHORS**  
 Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

**OTHER DESIGNS**  
 MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

- GENERAL NOTES**
- Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
  - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
  - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- \* See BC(4) for definition of "Work Duration."
  - \*\* Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
  - See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

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 Texas Department of Transportation  
 Traffic Safety Division Standard

**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**  
 BC(5) - 21

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXXX BLVD CLOSED	

### Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

\* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

### Location List

AT FM XXXX	BEFORE RAILROAD CROSSING	NEXT X MILES	PAST US XXX EXIT	XXXXXXXXX TO XXXXXXXX	US XXX TO FM XXXX
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### Warning List

SPEED LIMIT XX MPH	MAXIMUM SPEED XX MPH	MINIMUM SPEED XX MPH	ADVISORY SPEED XX MPH	RIGHT LANE EXIT	USE CAUTION	DRIVE SAFELY	DRIVE WITH CARE
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### \*\* Advance Notice List

TUE-FRI XX AM-X PM	APR XX-XX X PM-X AM	BEGINS MONDAY	BEGINS MAY XX	MAY X-X XX PM - XX AM	NEXT FRI-SUN	XX AM TO XX PM	NEXT TUE AUG XX	TONIGHT XX PM-XX AM
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\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
- For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

## WORDING ALTERNATIVES

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

## FULL MATRIX PCMS SIGNS

- When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
- A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Hour(s)	HR, HRS	Time Minutes	TIME MIN
Information	INFO	Upper Level	UPR LEVEL
It Is	ITS	Vehicles (s)	VEH, VEHS
Junction	JCT	Warning	WARN
Left	LFT	Wednesday	WED
Left Lane	LFT LN	Weight Limit	WT LIMIT
Lane Closed	LN CLOSED	West	W
Lower Level	LWR LEVEL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number



## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

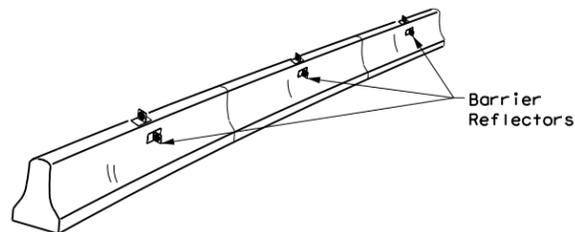
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REVISIONS		DIST:		COUNTY:		SHEET NO.:			
9-07	8-14	YKM		FAYETTE					17
7-13	5-21								

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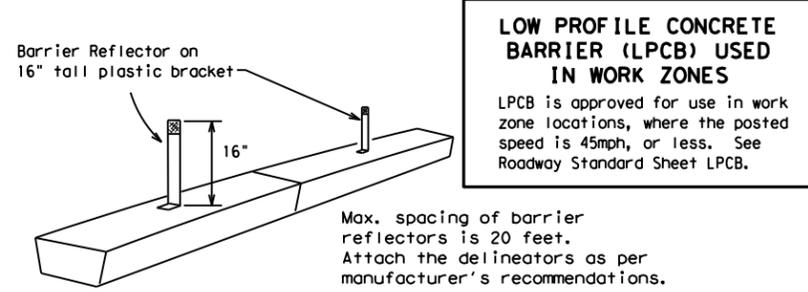
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



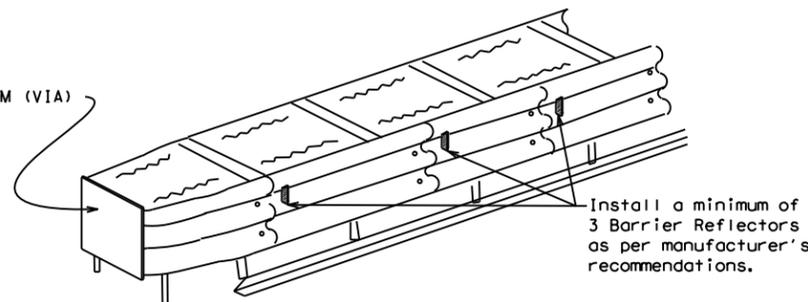
**CONCRETE TRAFFIC BARRIER (CTB)**

- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.



**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**  
 LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

**END TREATMENTS FOR CTB'S USED IN WORK ZONES**  
 End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

**BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS**

**WARNING LIGHTS**

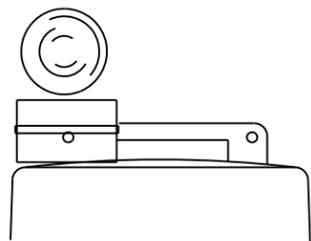
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B<sub>FL</sub> or C<sub>FL</sub> Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

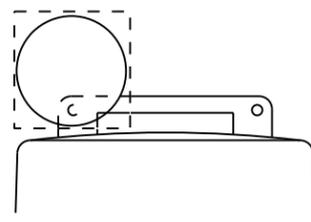
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

**WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS**

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



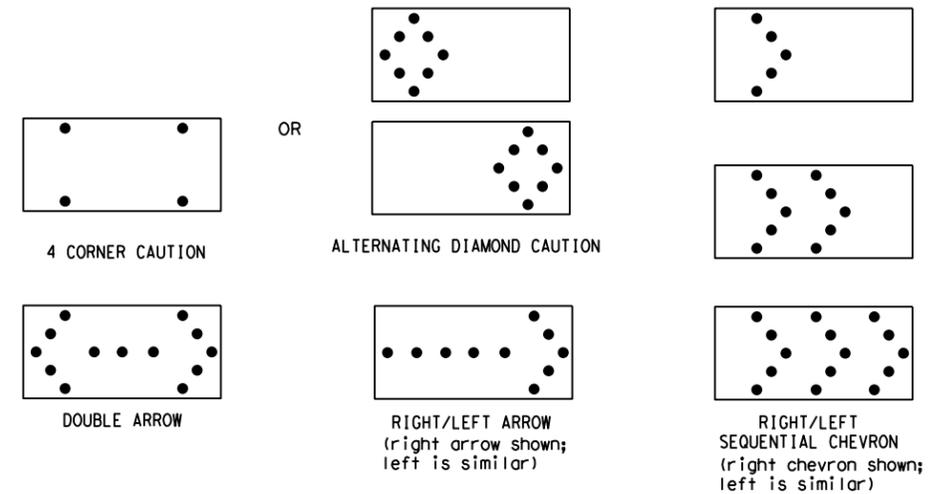
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
- The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

**ATTENTION**  
 Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



**BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR**

**BC (7) - 21**

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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**GENERAL NOTES**

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

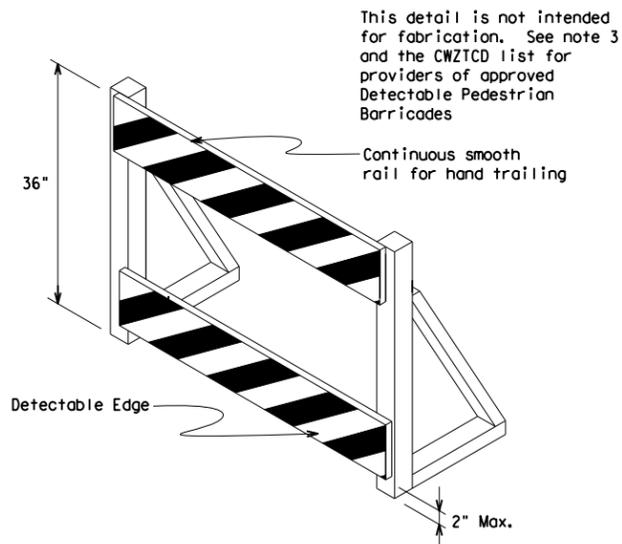
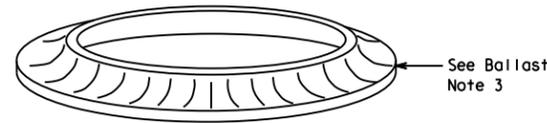
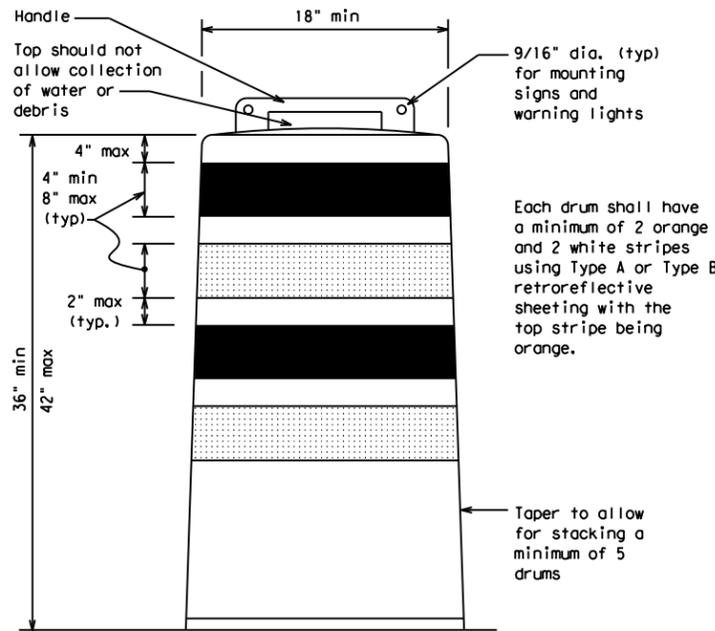
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectORIZED space between any two adjacent stripes shall not exceed 2 inches in width.
- Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

**RETROREFLECTIVE SHEETING**

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

**BALLAST**

- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



**DETECTABLE PEDESTRIAN BARRICADES**

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign (Maximum Sign Dimension)  
 Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer

12" x 24" Vertical Panel  
 mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



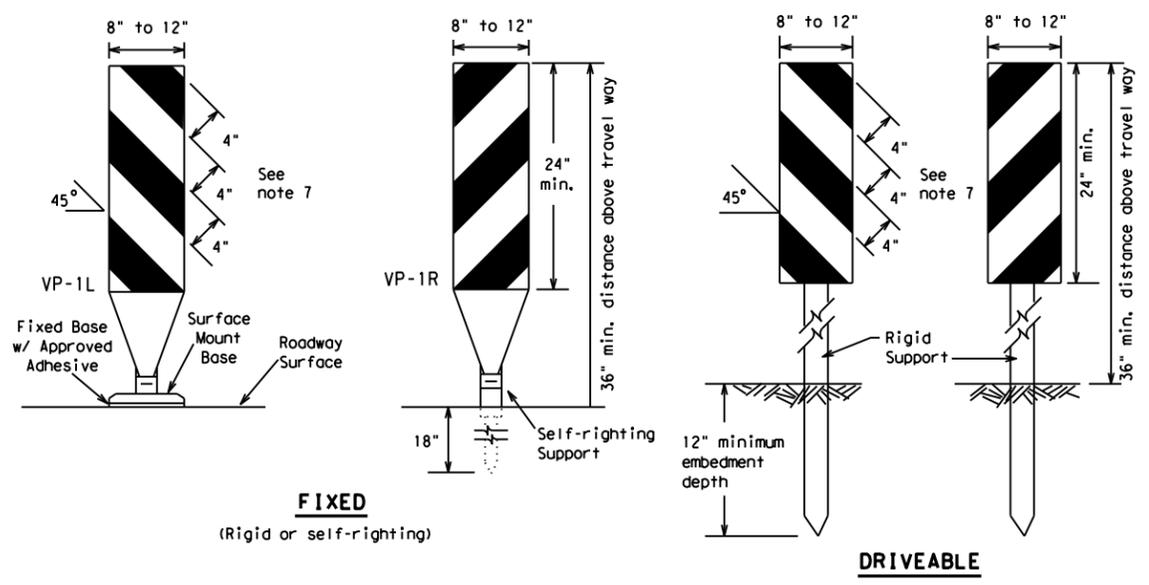
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC(8) - 21**

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7-13				

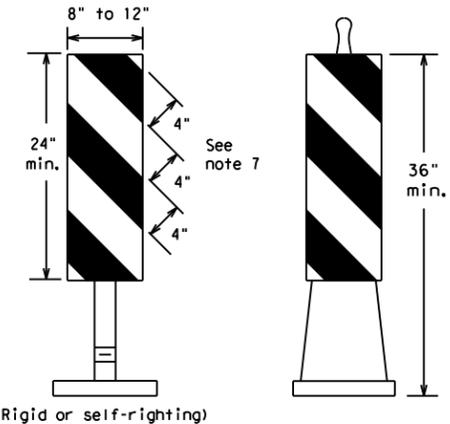
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**FIXED**  
(Rigid or self-righting)

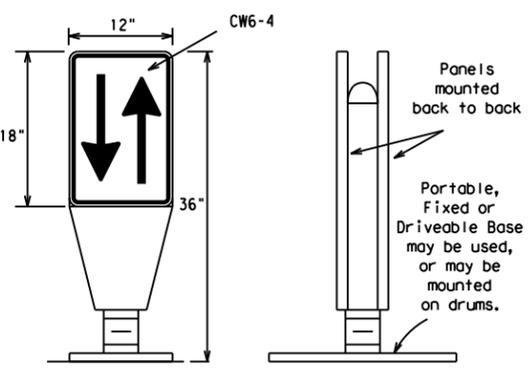
**DRIVEABLE**



**PORTABLE**

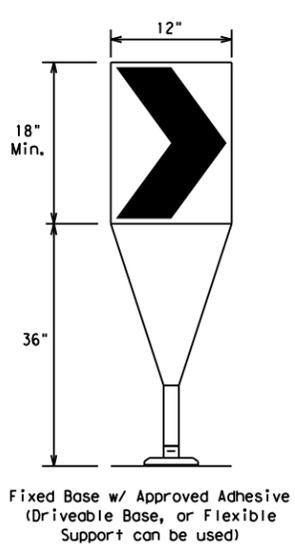
**VERTICAL PANELS (VPs)**

- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
- VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

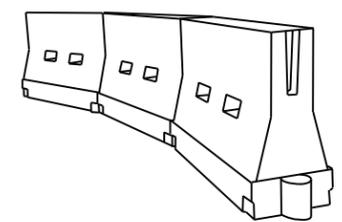
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B<sub>FL</sub> or Type C<sub>FL</sub> conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

**HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS**

**GENERAL NOTES**

- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed	Formula	Minimum Desirable Taper Lengths			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

\*\*Taper lengths have been rounded off.  
 L=Length of Taper (FT.) W=Width of Offset (FT.)  
 S=Posted Speed (MPH)

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 21**

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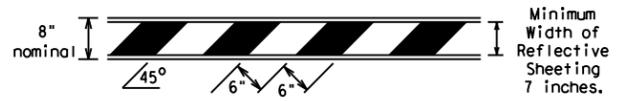
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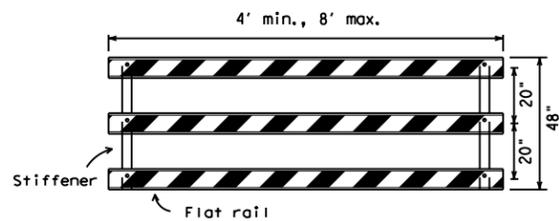
**TYPE 3 BARRICADES**

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



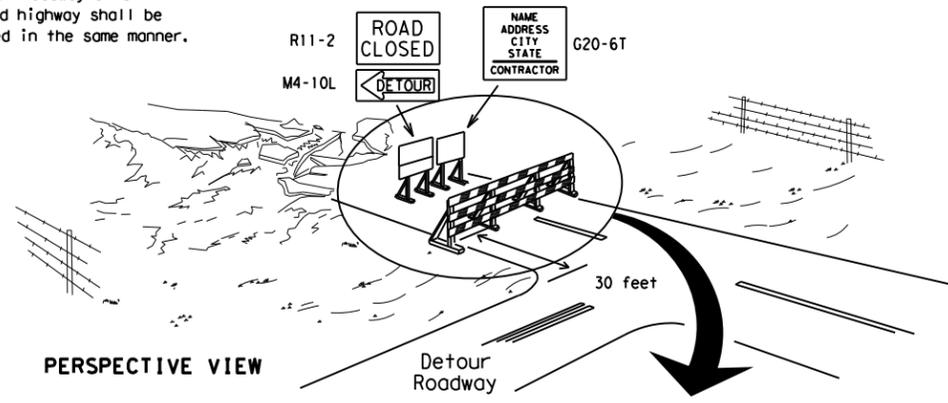
**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

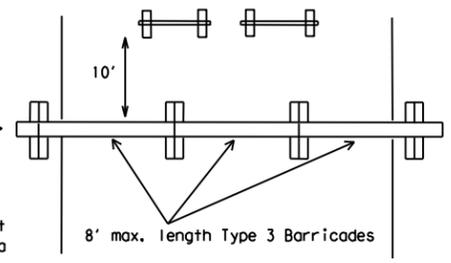
**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

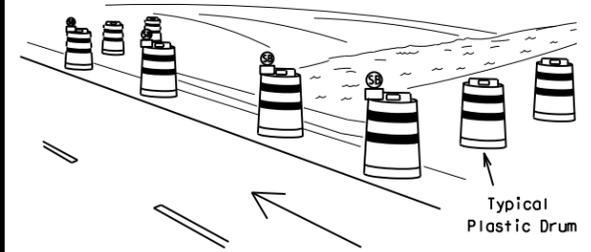
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



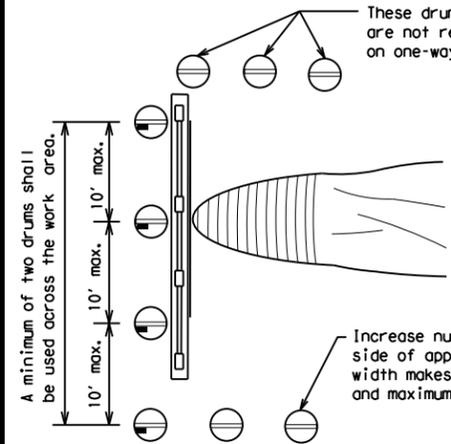
PLAN VIEW

1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



PERSPECTIVE VIEW

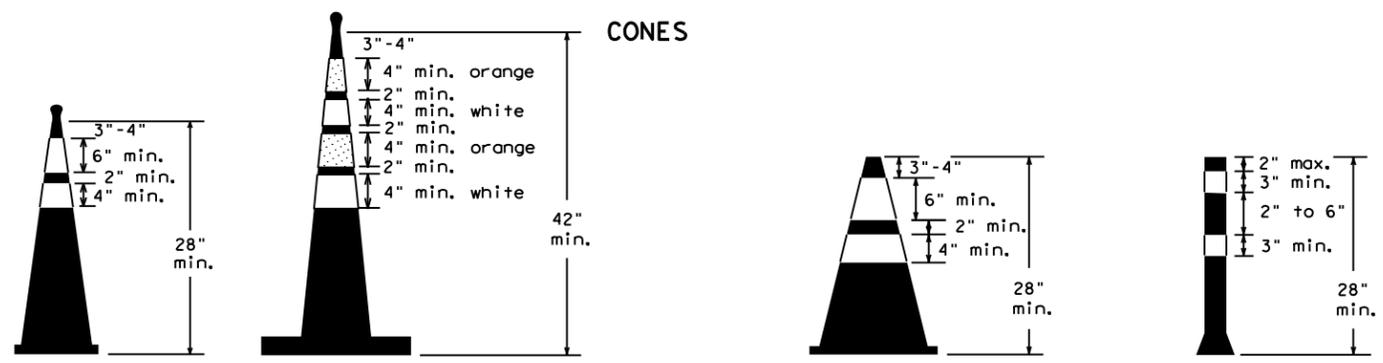


PLAN VIEW

1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
	Steady burn warning light or yellow warning reflector

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**



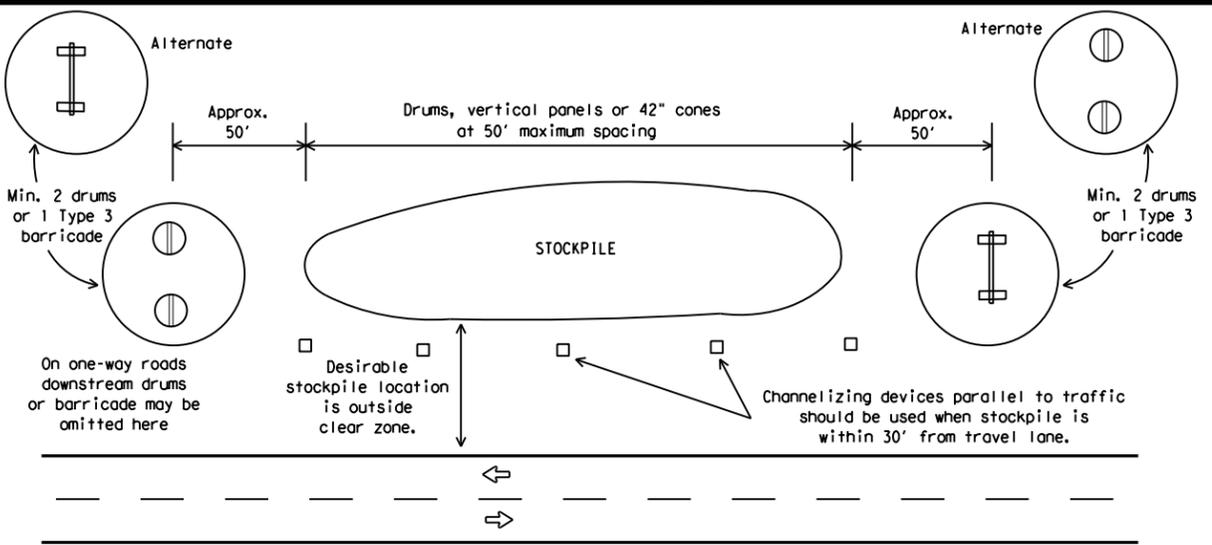
Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.  
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

### PREFABRICATED PAVEMENT MARKINGS

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
- Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

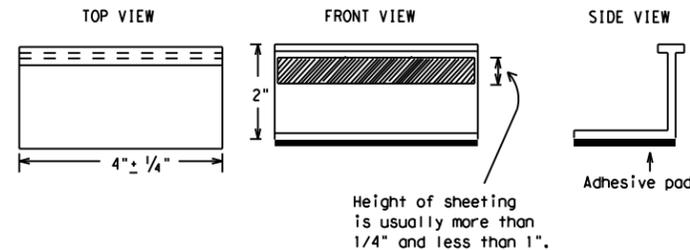
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

### REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
- The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

## Temporary Flexible-Reflective Roadway Marker Tabs



**STAPLES OR NAILS SHALL NOT BE USED TO SECURE  
TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER  
TABS TO THE PAVEMENT SURFACE**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
  - Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
  - Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- Small design variances may be noted between tab manufacturers.
- See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:  
 YELLOW - (two amber reflective surfaces with yellow body).  
 WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

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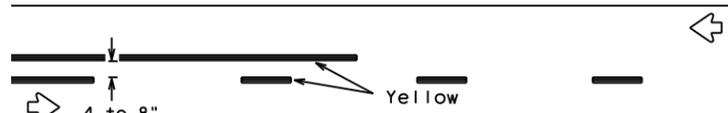
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## PAVEMENT MARKING PATTERNS

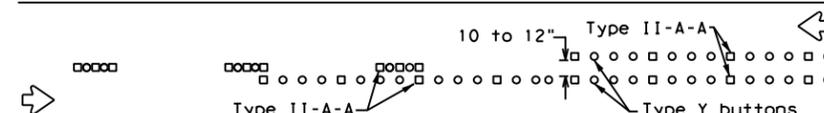


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

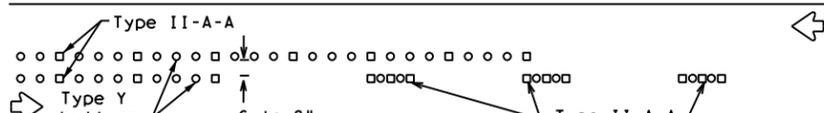


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectORIZED pavement markings.

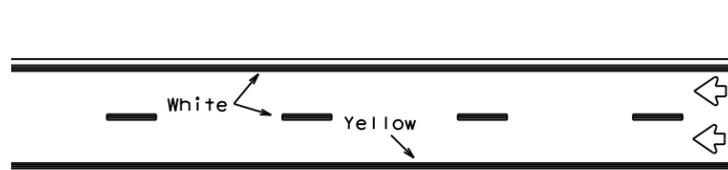


RAISED PAVEMENT MARKERS - PATTERN A



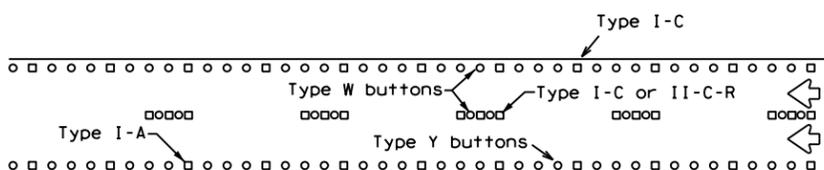
RAISED PAVEMENT MARKERS - PATTERN B

## CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



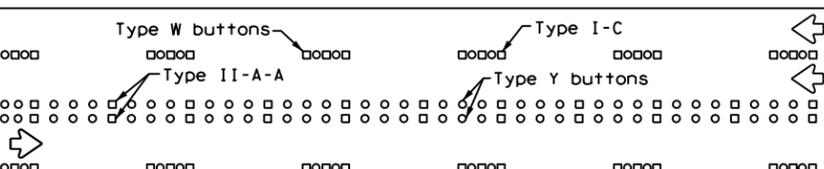
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



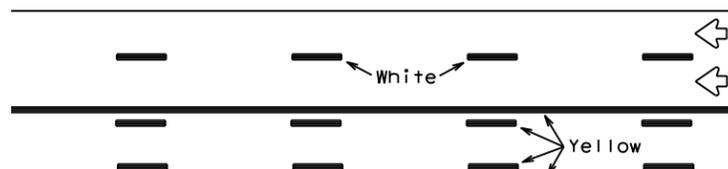
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



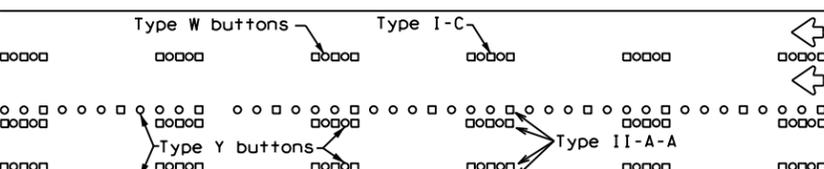
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

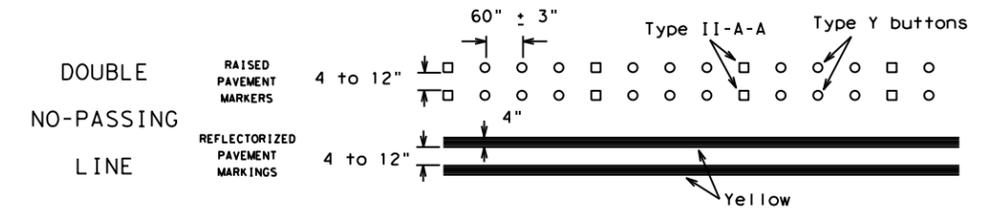
Prefabricated markings may be substituted for reflectORIZED pavement markings.



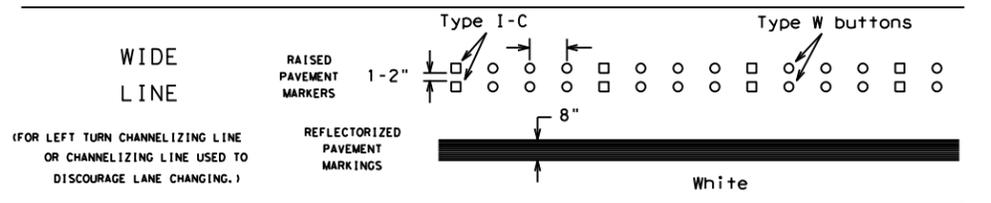
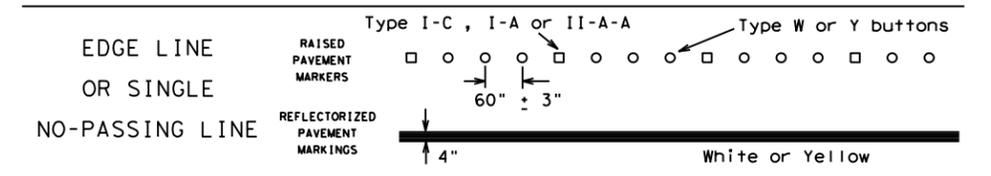
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

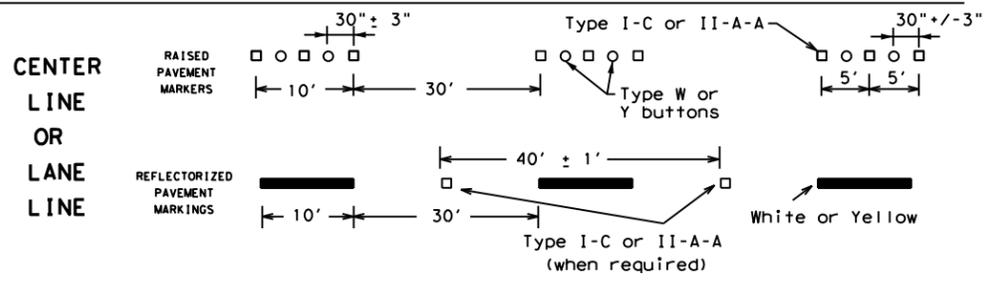
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



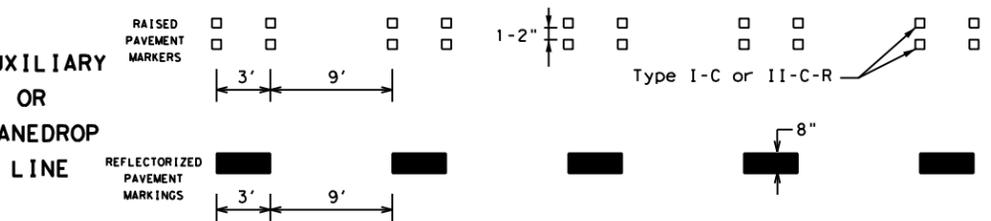
### SOLID LINES



### BROKEN LINES

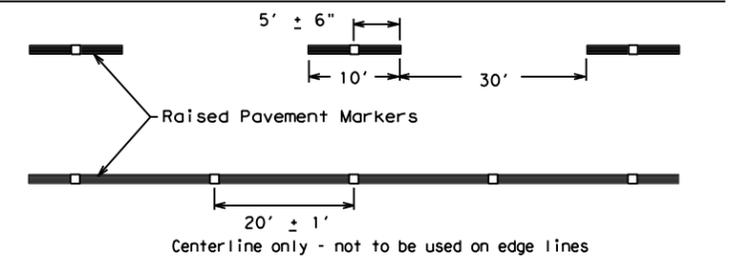


### AUXILIARY OR LANEDROP LINE



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
1-97 9-07 5-21				
2-98 7-13				
11-02 8-14				
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	23	

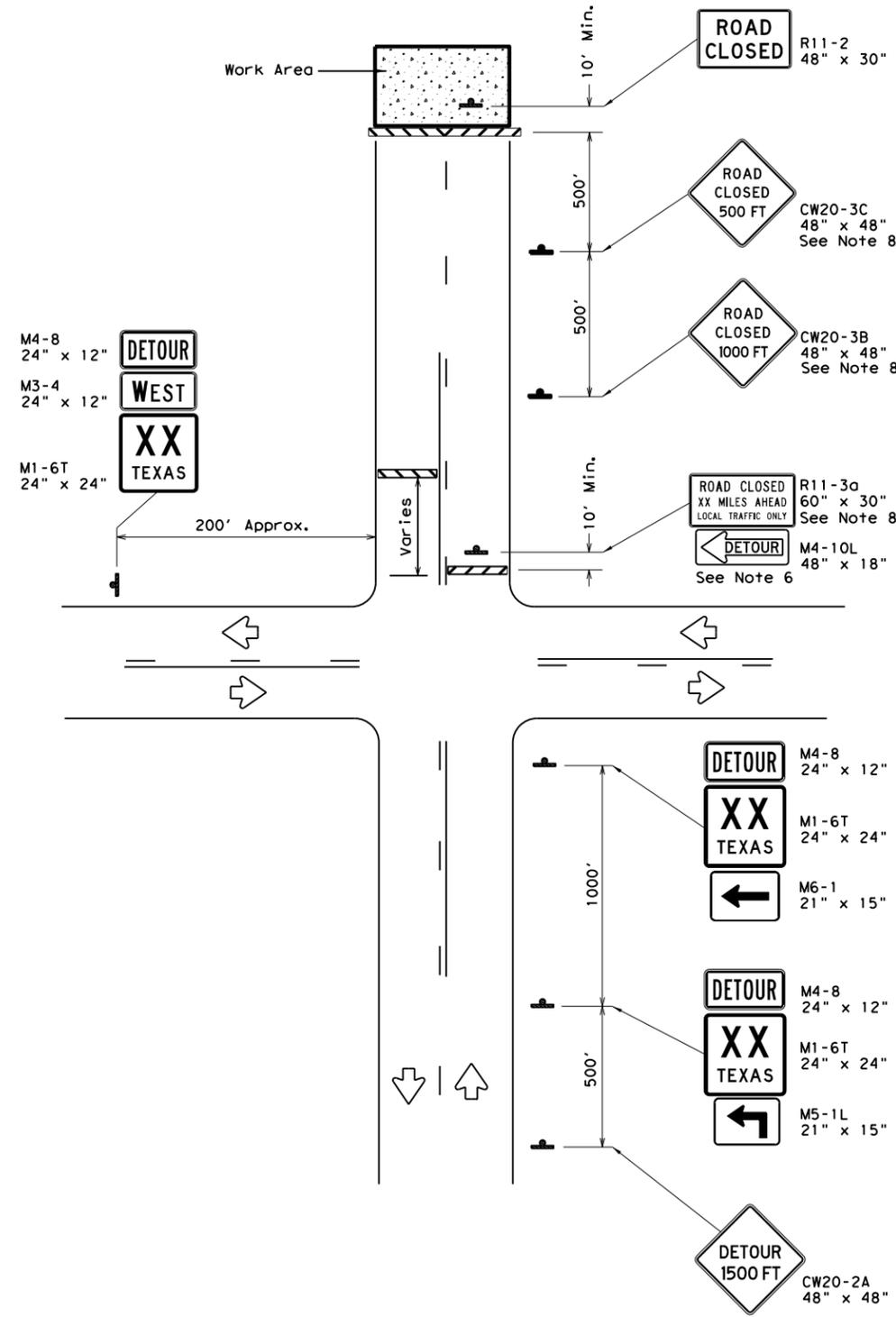
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

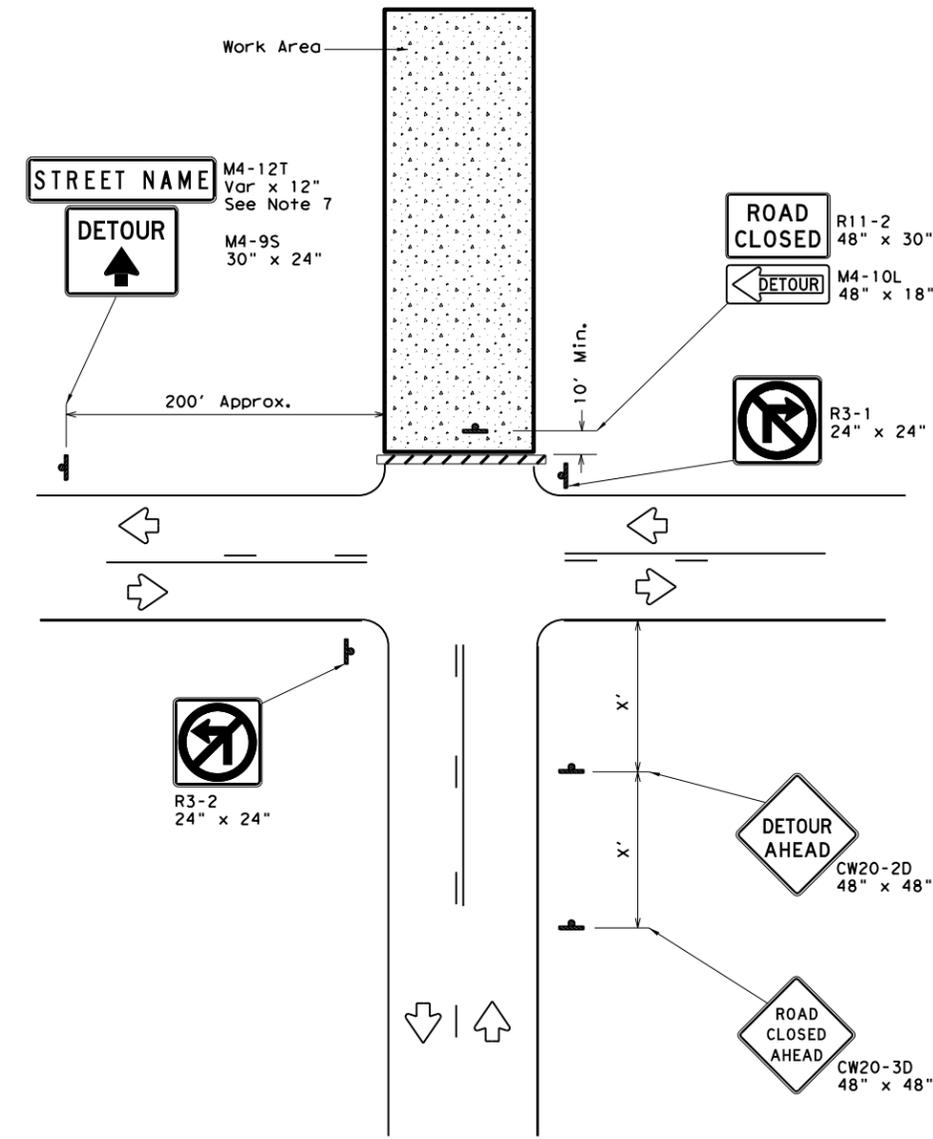
DATE: 3/6/2023 4:19:49 PM  
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DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/6/2023 4:19:54 PM  
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**ROAD CLOSURE BEYOND THE INTERSECTION**  
 Signing for a Numbered Route with an Off-Site Detour



**ROAD CLOSURE AT THE INTERSECTION**  
 Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "x" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

**GENERAL NOTES**

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation Traffic Operations Division Standard

**WORK ZONE ROAD CLOSURE DETAILS**

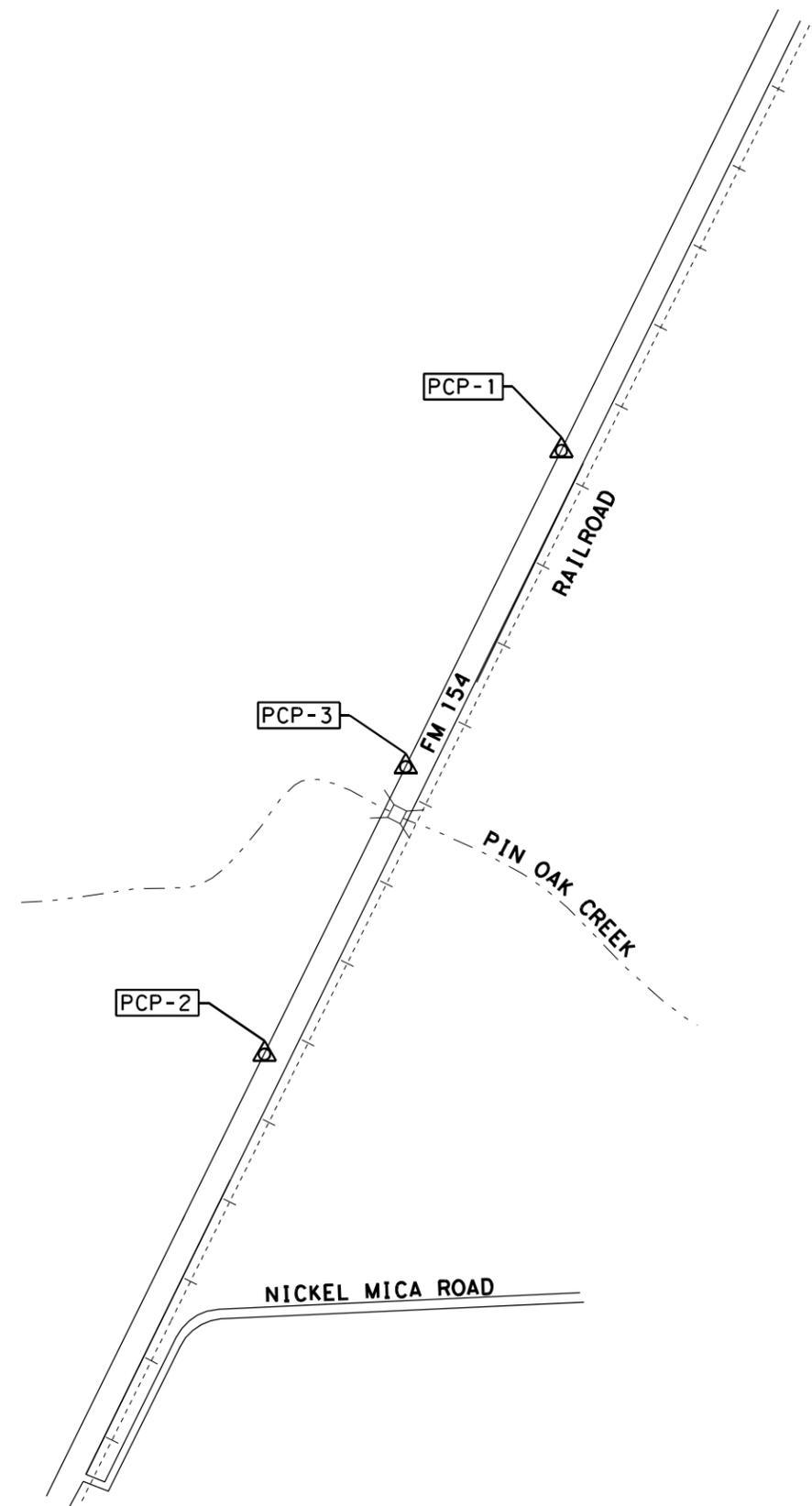
**WZ (RCD) - 13**

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
1-97 4-98 7-13	DIST	COUNTY	SHEET NO.	
2-98 3-03	YKM	FAYETTE	24	

CONTROL POINT	SURFACE COORDINATES		GRID COORDINATES		LATITUDE	LONGITUDE	ELEVATION	DESCRIPTION
	NORTHING	EASTING	NORTHING	EASTING				
PCP-1	13,830,119.31	2,568,944.53	13,828,321.63	2,568,610.61	29° 45' 31.91803"N	97° 06' 30.64921"W	368.41	SET TxDOT 3-1/4" ALUMINUM DISK IN CONCRETE
PCP-2	13,827,872.91	2,567,836.73	13,826,075.52	2,567,502.96	29° 45' 09.86154"N	97° 06' 43.62674"W	358.80	SET TxDOT 3-1/4" ALUMINUM DISK IN CONCRETE
PCP-3	13,828,942.56	2,568,363.65	13,827,145.03	2,568,029.81	29° 45' 20.36412"N	97° 06' 37.45400"W	358.43	SET TxDOT 3-1/4" ALUMINUM DISK IN CONCRETE

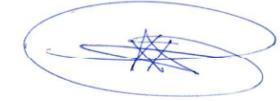
NOTES:

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983 TEXAS SOUTH CENTRAL ZONE (4204), NORTH AMERICAN DATUM OF 1983 (NAD83) 2010 ADJUSTMENT, EPOCH 2010 (GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
2. ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK (HALLETTSVILLE), BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS.
3. UNIT OF MEASURE IS U.S. SURVEY FOOT.
4. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK (HALLETTSVILLE).
5. FIELD SURVEYS WERE PERFORMED DURING OCTOBER 2021.



LEGEND

PRIMARY



8/19/2022

ROBERTO A. ARAUJO-CRUZ - R.P.L.S. NO. 6653

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

**LTRA** LINA T. RAMEY & ASSOCIATES, INC.  
3320 Belt Line Road  
Farmers Branch, Texas 75234 - 214-979-1144  
TBPELS FIRM NO. F-782, 10140700

**Kimley»Horn** F-928



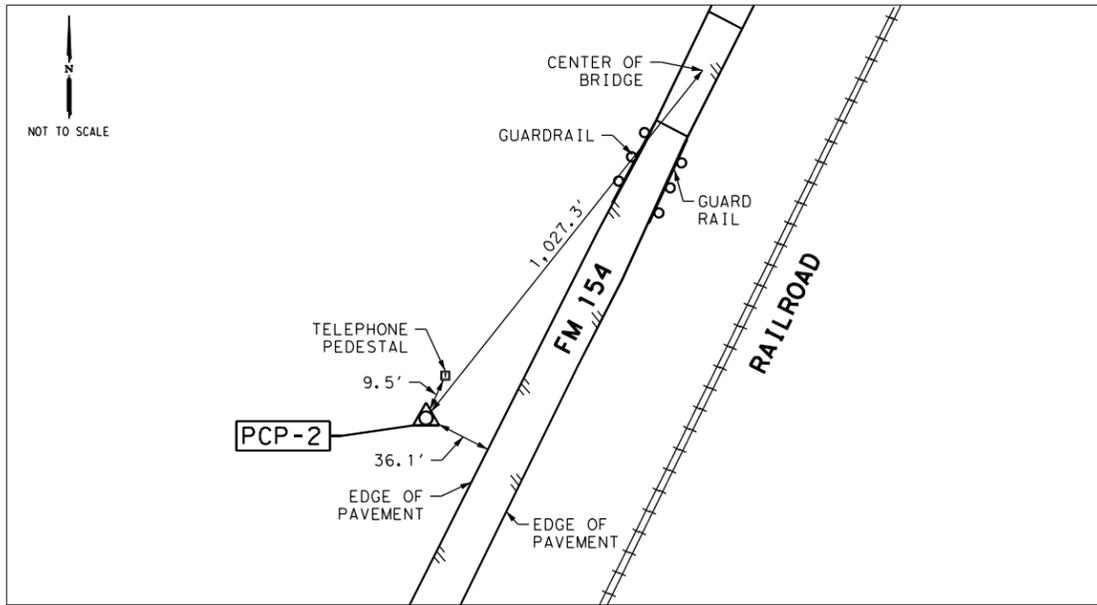
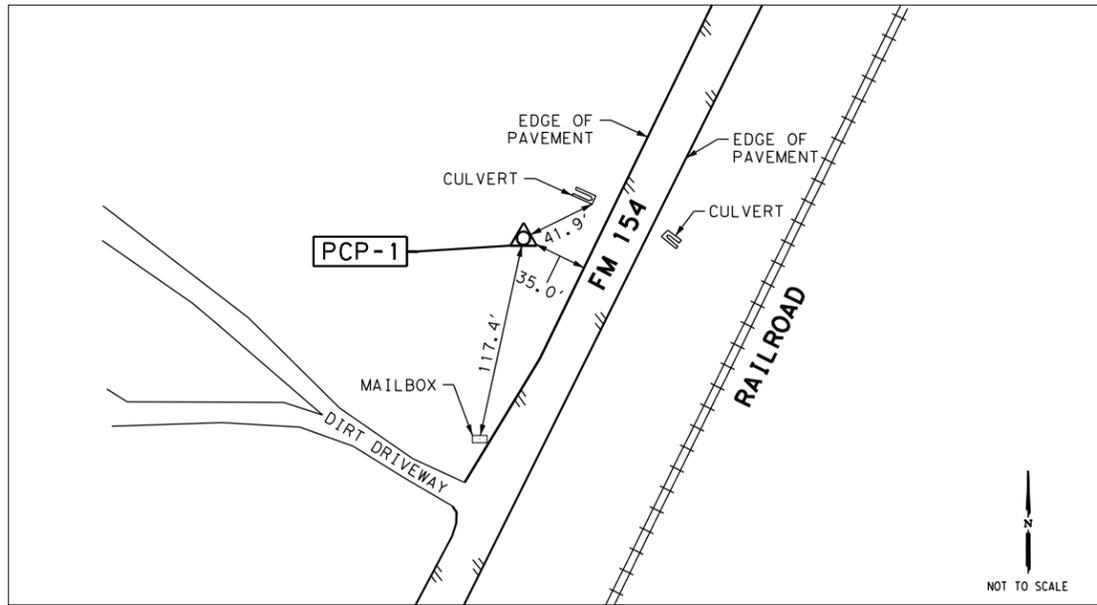
FM 154  
AT PIN OAK CREEK  
HORIZONTAL AND VERTICAL  
CONTROL SHEETS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YKM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		
25		

8/19/2022 \$FILEL\$

8/19/2022 0: \\_ (086) \\_ Kimley-Horn\21.086.15 WA 5 Various Design and ROW Projects YKM\FM 154\Control\Control Sheets\_Detail1.dgn



**CONTROL POINT: PCP-1**

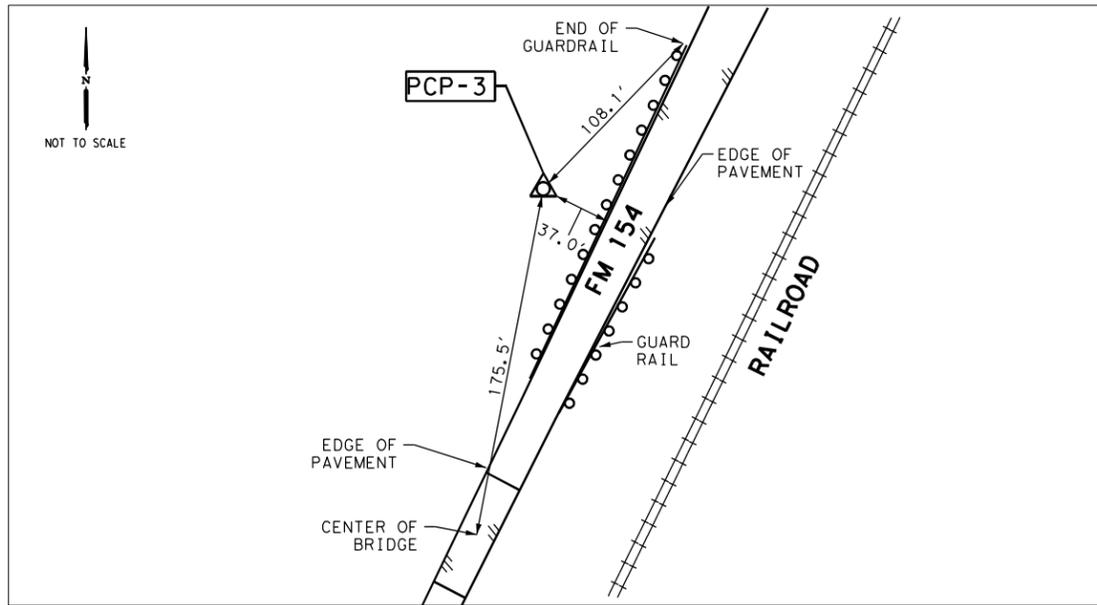
PCP-1 IS A 3-1/4" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE WEST SIDE OF FM 154, +/- 0.8 MILES NORTH OF THE INTERSECTION OF NICKEL MICA ROAD, +/- 117.4 FEET NORTH OF A MAIL BOX, +/- 35.0 FEET WEST OF THE EDGE OF PAVEMENT AND 41.9 FEET SOUTH OF THE TOP SOUTHEAST CORNER OF A CULVERT.

SURFACE COORDINATES:		GRID COORDINATES:		LATITUDE: 29° 45' 31.91803" N	
NORTHING:	13,830,119.31	NORTHING:	13,828,321.63	EASTING:	2,568,944.53
EASTING:	2,568,944.53	EASTING:	2,568,610.61	LONGITUDE:	97° 06' 30.64921" W
ELEVATION:	368.41	ELEVATION:	368.41		

**CONTROL POINT: PCP-2**

PCP-2 IS A 3-1/4" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE WEST SIDE OF FM 154, +/- 0.3 MILES NORTH OF THE INTERSECTION OF NIKEL MICA ROAD, +/- 36.1 FEET WEST OF THE EDGE OF PAVEMENT, +/- 9.5 FEET SOUTH OF A TELEPHONE PEDISTAL AND 1,027.3 FEET SOUTH OF THE CENTER OF THE BRIDGE.

SURFACE COORDINATES:		GRID COORDINATES:		LATITUDE: 29° 45' 09.86154" N	
NORTHING:	13,827,872.91	NORTHING:	13,826,075.52	EASTING:	2,567,836.73
EASTING:	2,567,836.73	EASTING:	2,567,502.96	LONGITUDE:	97° 06' 43.62674" W
ELEVATION:	358.80	ELEVATION:	358.80		



**CONTROL POINT: PCP-3**

PCP-3 IS A 3-1/4" TxDOT ALUMINUM DISK SET IN CONCRETE, LOCATED ON THE WEST SIDE OF FM 154, +/- 0.5 MILES NORTH OF THE INTERSECTION OF NIKEL MILA ROAD, +/- 175.5 FEET NORTH OF THE CENTER OF THE BRIDGE, +/- 37.0 FEET WEST OF THE EDGE OF PAVEMENT AND 108.1 FEET SOUTHWEST OF THE END OF THE GUARDRAIL

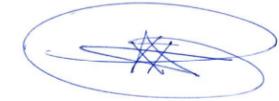
SURFACE COORDINATES:		GRID COORDINATES:		LATITUDE: 29° 45' 20.36412" N	
NORTHING:	13,828,942.56	NORTHING:	13,827,145.03	EASTING:	2,568,363.65
EASTING:	2,568,363.65	EASTING:	2,568,029.81	LONGITUDE:	97° 06' 37.45400" W
ELEVATION:	358.43	ELEVATION:	358.43		

**NOTES:**

- ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, TEXAS SOUTH CENTRAL ZONE (4204), NORTH AMERICAN DATUM OF 1983 (NAD83) 2011 ADJUSTMENT, EPOCH 2010 (GEOID 12A). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY A COMBINED ADJUSTMENT FACTOR OF 1.00013.
- ALL HORIZONTAL CONTROL OF THIS PROJECT WAS ESTABLISHED BY TxDOT VIRTUAL REFERENCE SYSTEM NETWORK (HALLETTSVILLE), BASED ON THREE AVERAGED 180 EPOCH OBSERVATIONS.
- UNIT OF MEASURE IS U.S. SURVEY FOOT.
- VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON THREE 180 EPOCH OBSERVATIONS UTILIZING THE TxDOT VIRTUAL REFERENCE SYSTEM NETWORK (HALLETTSVILLE).
- FIELD SURVEYS WERE PERFORMED DURING OCTOBER 2021.

**LEGEND**

PRIMARY ▲



8/19/2022

ROBERTO A. ARAUJO-CRUZ - R.P.L.S. NO. 6653

THE CONTROL POINTS SHOWN HEREIN WERE DETERMINED BY A SURVEY MADE ON THE GROUND UNDER MY SUPERVISION.

**LTRA** LINA T. RAMEY & ASSOCIATES, INC.  
3320 Belt Line Road  
Farmers Branch, Texas 75234 - 214-979-1144  
TBPELS FIRM NO. F-782, 10140700

**Kimley»Horn** F-928



FM 154  
AT PIN OAK CREEK  
HORIZONTAL AND VERTICAL  
CONTROL SHEETS

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	26
CONT.	SECT.	JOB	
0334	08	037	

Beginning chain FM154 description  
 Feature: Road Centerline

Point 1 N 13,827,608.850 E 2,567,758.781 Sta 120+15.03

Course from 1 to PC FM154-1 N 26° 28' 11.90" E Dist 649.125

Curve Data  
 \*-----\*

Curve FM154-1  
 P.I. Station = 128+15.03 N 13,828,324.984 E 2,568,115.364  
 Delta = 0° 09' 03.15" (LT)  
 Degree = 0° 03' 00.00"  
 Tangent = 150.875  
 Length = 301.749  
 Radius = 114,591.560  
 External = 0.099  
 Long Chord = 301.749  
 Mid. Ord. = 0.099  
 P.C. Station = 126+64.16 N 13,828,189.926 E 2,568,048.115  
 P.T. Station = 129+65.90 N 13,828,460.219 E 2,568,182.258  
 C.C. = N 13,879,266.676 E 2,465,469.408  
 Back = N 26° 28' 11.90" E  
 Ahead = N 26° 19' 08.75" E  
 Chord Bear = N 26° 23' 40.32" E

Course from PT FM154-1 to PC FM154-2 N 26° 19' 08.75" E Dist 554.798

Curve Data  
 \*-----\*

Curve FM154-2  
 P.I. Station = 137+89.80 N 13,829,198.708 E 2,568,547.548  
 Delta = 0° 16' 08.75" (LT)  
 Degree = 0° 03' 00.00"  
 Tangent = 269.097  
 Length = 538.194  
 Radius = 114,591.560  
 External = 0.316  
 Long Chord = 538.193  
 Mid. Ord. = 0.316  
 P.C. Station = 135+20.70 N 13,828,957.506 E 2,568,428.238  
 P.T. Station = 140+58.90 N 13,829,440.469 E 2,568,665.724  
 C.C. = N 13,879,763.962 E 2,465,715.388  
 Back = N 26° 19' 08.75" E  
 Ahead = N 26° 03' 00.00" E  
 Chord Bear = N 26° 11' 04.37" E

Course from PT FM154-2 to 2 N 26° 03' 00.00" E Dist 530.903

Point 2 N 13,829,917.437 E 2,568,898.872 Sta 145+89.80

Ending chain FM154 description

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03/07/2023

*Hayden Morris*

**Kimley»Horn** F-928



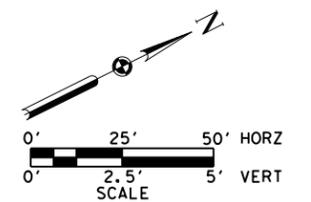
FM 154 AT PIN OAK CREEK

**HORIZONTAL  
 ALIGNMENT DATA**

SHEET 1 OF 1

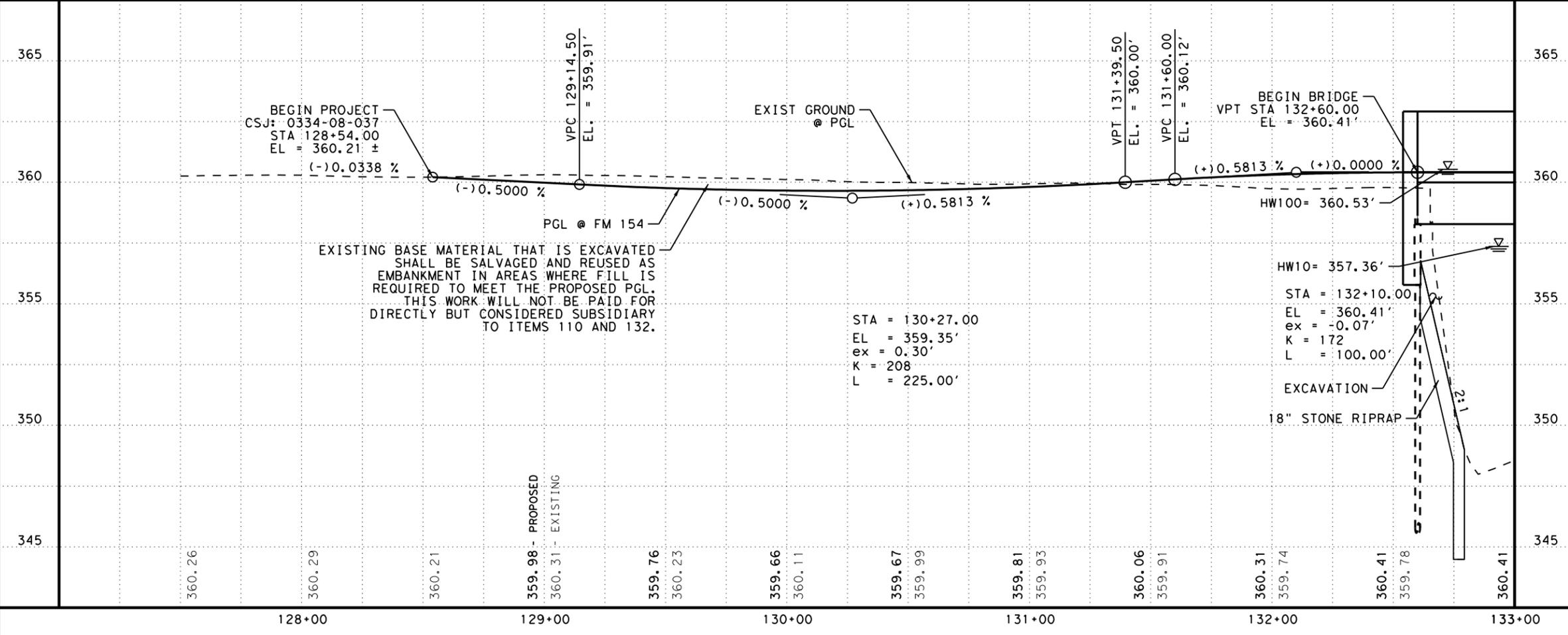
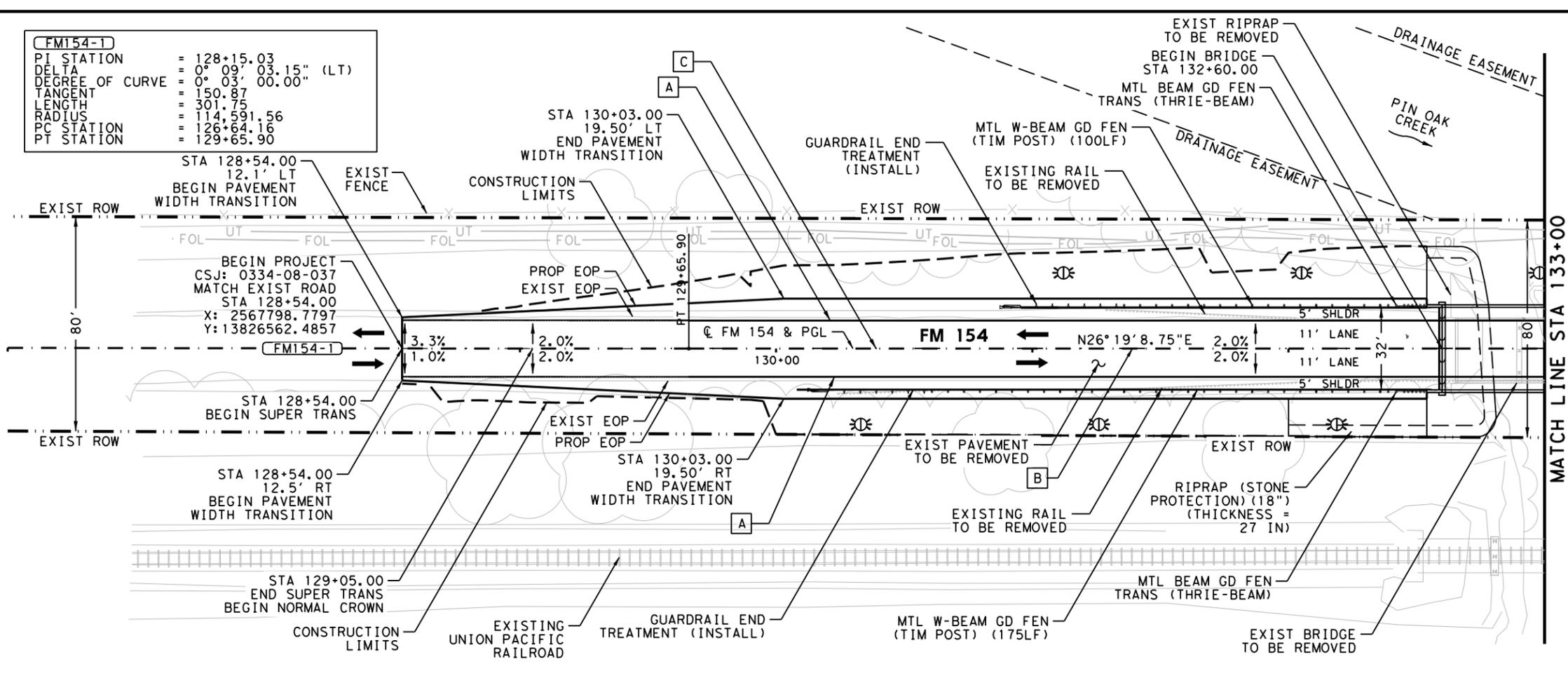
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		
27		

<b>FM154-1</b>	
PI STATION	= 128+15.03
DELTA	= 0° 03' 03.15" (LT)
DEGREE OF CURVE	= 0° 03' 00.00"
TANGENT	= 150.87
LENGTH	= 301.75
RADIUS	= 114,591.56
PC STATION	= 126+64.16
PT STATION	= 129+65.90



- LEGEND**
- A W 6" SOLID
  - B Y 6" BROKEN
  - C TY II-A-A
  - DELINEATOR
  - DIRECTION OF TRAFFIC
  - FOL - BURIED FIBER OPTIC
  - UT - BURIED CABLE/PHONE
  - x - EXISTING FENCE
  - FM154-1 ALIGNMENT CURVE NUMBER

- NOTES:**
- UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
  - SEE ALIGNMENT DATA SHEET FOR ADDITIONAL HORIZONTAL ALIGNMENT INFORMATION.
  - EXISTING ROW SHOWN IS APPROXIMATE FROM AVAILABLE ROW MAPS AND GIS. IT IS SHOWN FOR INFORMATION ONLY. THE CONTRACTOR SHALL NOT CROSS EXISTING RAILROAD ROW AT ANY POINT DURING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO SUBMIT AN ERECTION PLAN TO TXDOT SHOWING HOW CRANE STAGING WILL PREVENT ANY POSSIBILITY OF EQUIPMENT FALLING ONTO RAILROAD ROW.



EXISTING BASE MATERIAL THAT IS EXCAVATED SHALL BE SALVAGED AND REUSED AS EMBANKMENT IN AREAS WHERE FILL IS REQUIRED TO MEET THE PROPOSED PGL. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO ITEMS 110 AND 132.

STA = 130+27.00  
 EL = 359.35'  
 ex = 0.30'  
 K = 208  
 L = 225.00'

BEGIN BRIDGE  
 VPT STA 132+60.00  
 EL = 360.41'  
 HW100 = 360.53'  
 HW10 = 357.36'  
 STA = 132+10.00  
 EL = 360.41'  
 ex = -0.07'  
 K = 172  
 L = 100.00'



*Hayden Morris*

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

**ROADWAY  
 PLAN AND PROFILE**

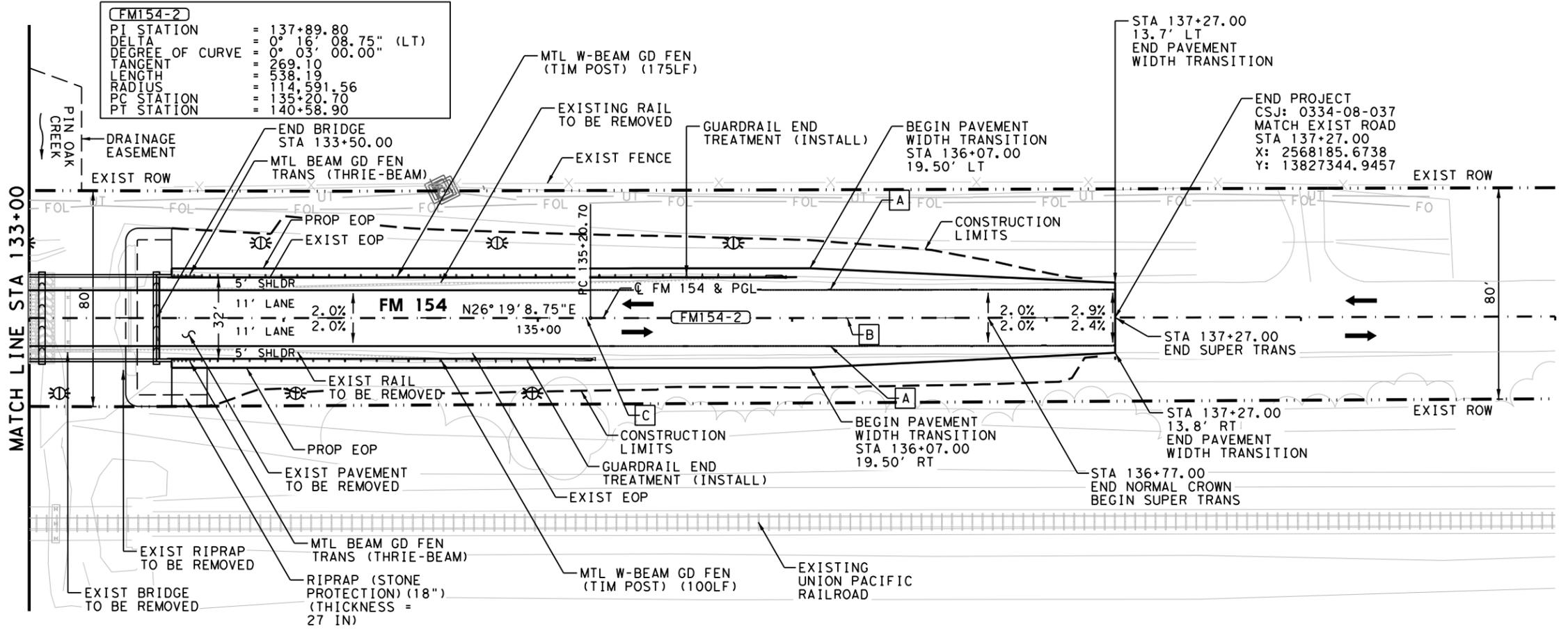
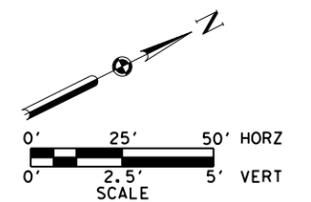
BEGIN PROJECT TO STA 133+00

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		28

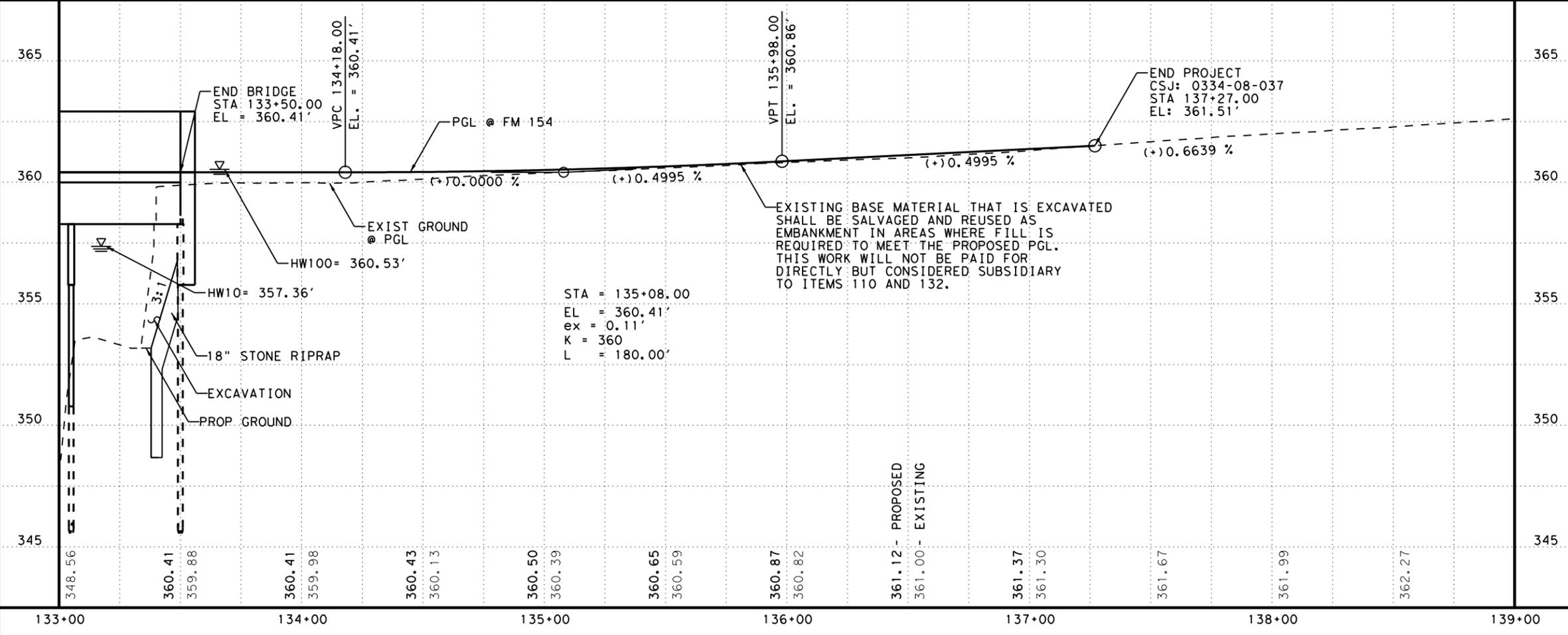
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<b>FM154-2</b>	
PI STATION	= 137+89.80
DELTA	= 0° 16' 08.75" (LT)
DEGREE OF CURVE	= 0° 03' 00.00"
TANGENT	= 269.10
LENGTH	= 538.19
RADIUS	= 114,591.56
PC STATION	= 135+20.70
PT STATION	= 140+58.90



- LEGEND**
- A W 6" SOLID
  - B Y 6" BROKEN
  - C TY II-A-A
  - DELINEATOR
  - DIRECTION OF TRAFFIC
  - FOL - BURIED FIBER OPTIC
  - UT - BURIED CABLE/PHONE
  - x - EXISTING FENCE
  - FM154-2 ALIGNMENT CURVE NUMBER
- NOTES:**
- UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
  - SEE ALIGNMENT DATA SHEET FOR ADDITIONAL HORIZONTAL ALIGNMENT INFORMATION.
  - EXISTING ROW SHOWN IS APPROXIMATE FROM AVAILABLE ROW MAPS AND GIS. IT IS SHOWN FOR INFORMATION ONLY. THE CONTRACTOR SHALL NOT CROSS EXISTING RAILROAD ROW AT ANY POINT DURING CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO SUBMIT AN ERECTION PLAN TO TXDOT SHOWING HOW CRANE STAGING WILL PREVENT ANY POSSIBILITY OF EQUIPMENT FALLING ONTO RAILROAD ROW.

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03/07/2023

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

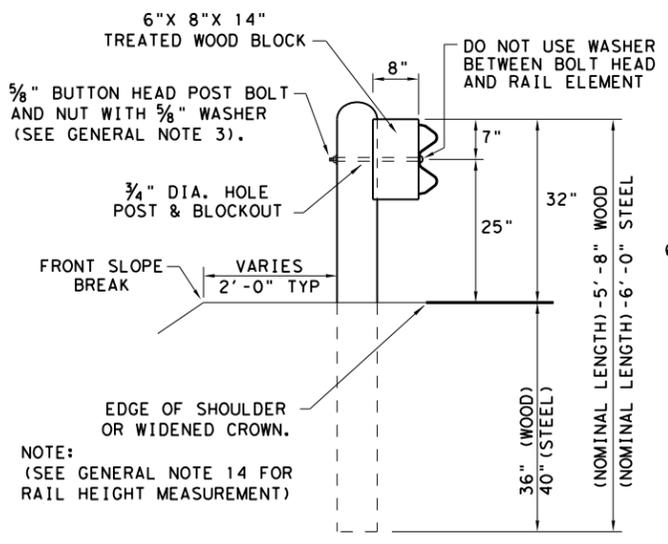
**ROADWAY PLAN AND PROFILE**

STA 133+00 TO END PROJECT

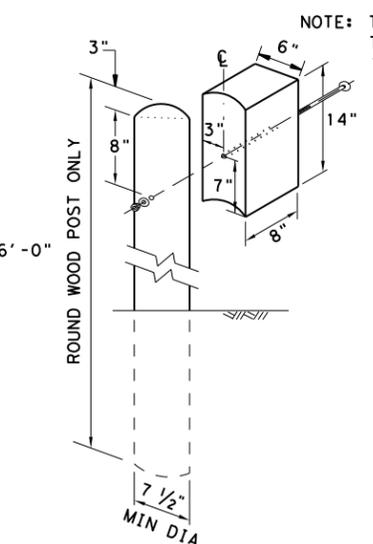
SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		29

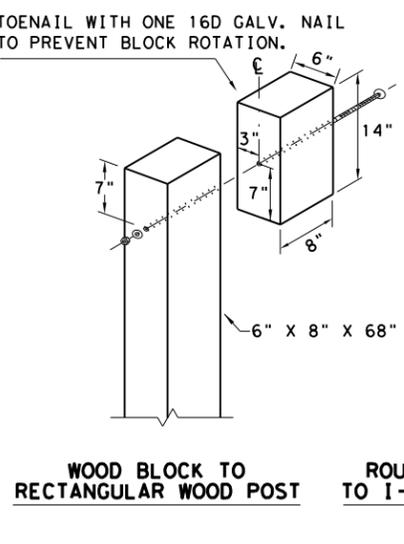
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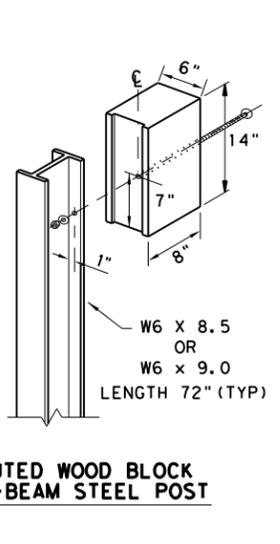
**TYPICAL POST PLACEMENT**



**WOOD BLOCK TO ROUND WOOD POST**



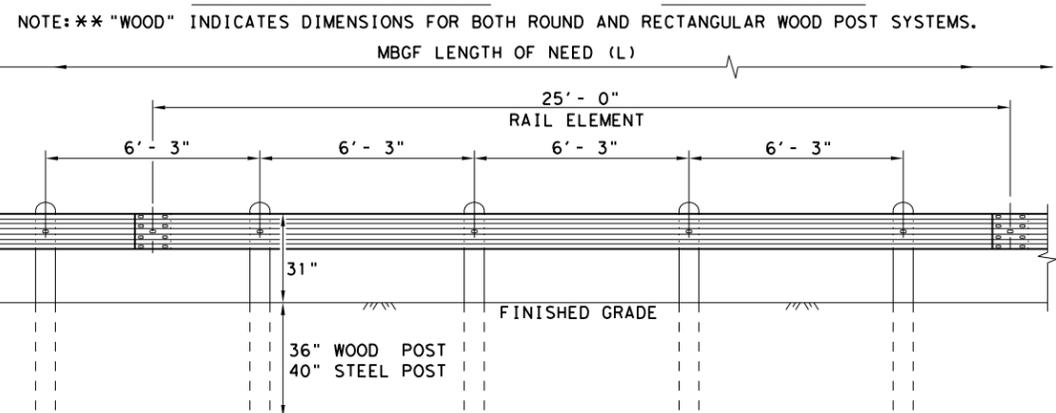
**WOOD BLOCK TO RECTANGULAR WOOD POST**



**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

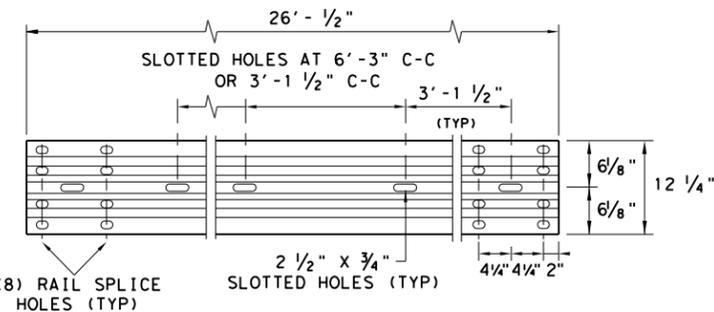
**GENERAL NOTES**

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.



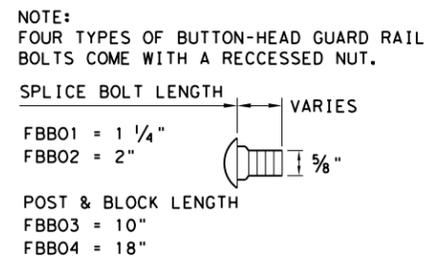
**ELEVATION MID-SPAN RAIL SPLICE**

SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



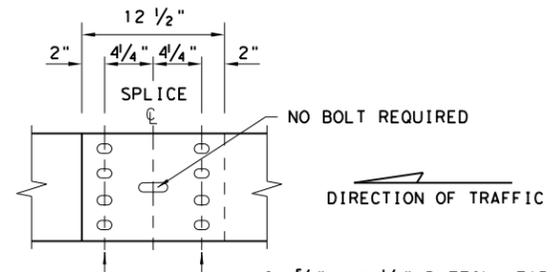
**ELEVATION 25'-0" (NOM.) W-BEAM SECTION**

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



**BUTTON HEAD BOLT**

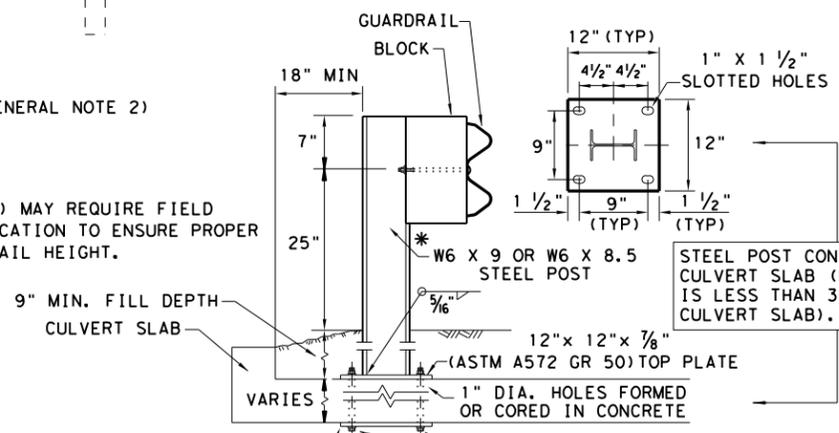
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



**MID-SPAN RAIL SPLICE DETAIL**

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

\* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.



**LOW FILL CULVERT POST**

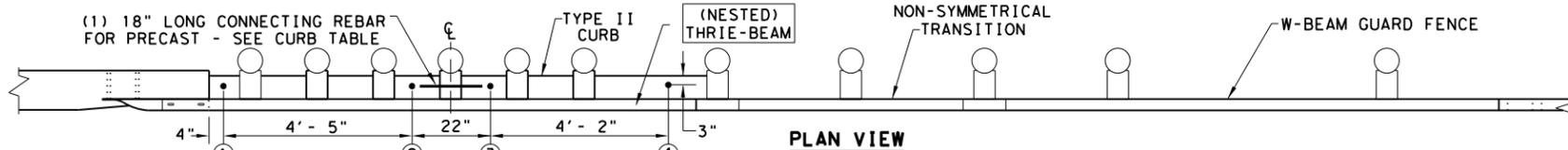
NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

		Design Division Standard	
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>			
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© TXDOT: NOVEMBER 2019	CONT	SECT	JOB
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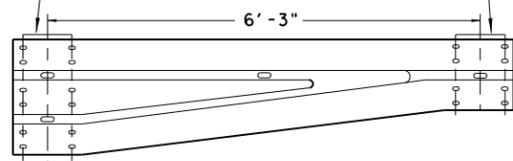
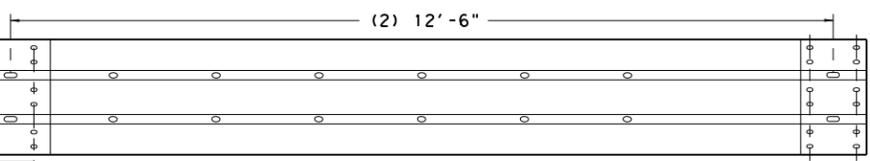
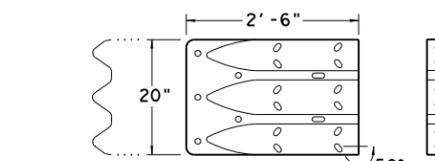
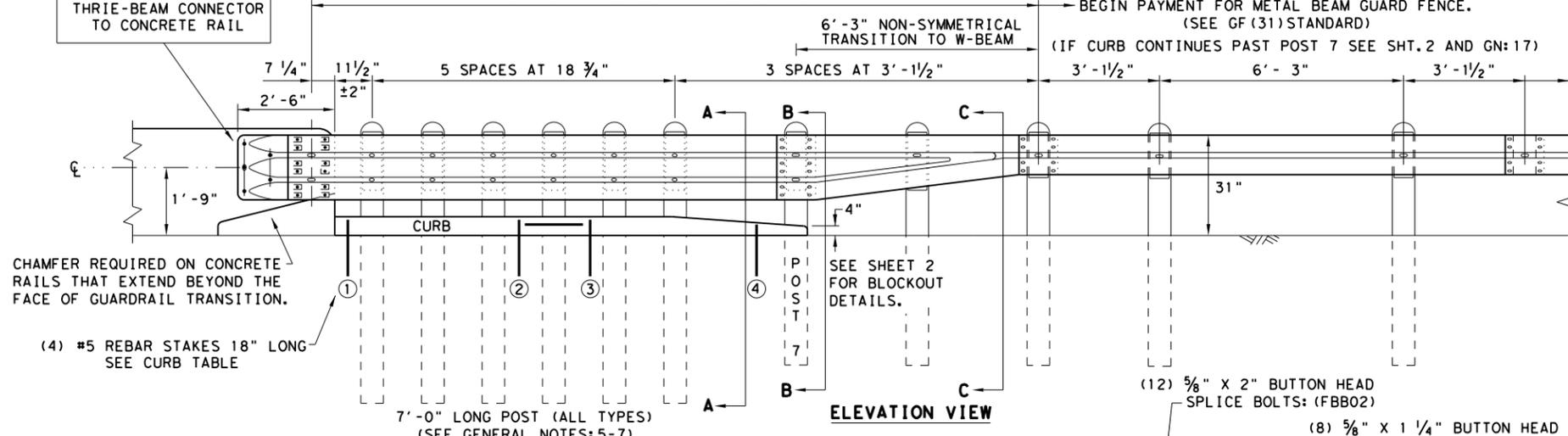
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- (5) 1" DIA. HOLES.
- (5) 5/8" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 5/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:  
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 5/8" HEX NUT. TRIM AS REQUIRED.

NOTE:  
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

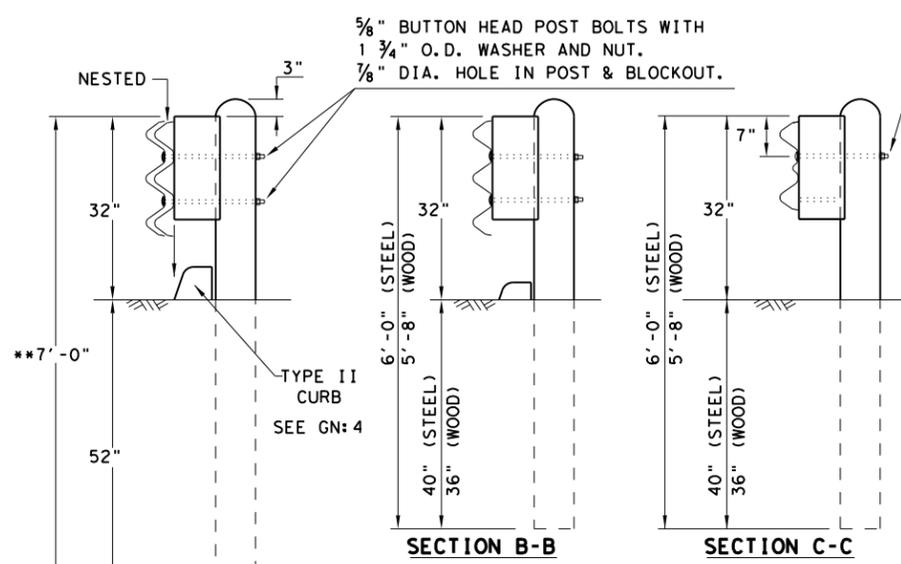


**THRIE-BEAM TERMINAL CONNECTOR 10GA.**  
PART DESIGNATOR RTE01D  
NOTE: SEE GENERAL NOTE: 9

**NESTED THRIE-BEAM RAIL**  
PART DESIGNATOR RTM10G  
(12) 5/8" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS: (FBB02)  
(12) RECTANGULAR GUARDRAIL PLATE WASHERS: (FWR03)

**NON-SYMMETRICAL W-BEAM TRANSITION TO THRIE-BEAM TRANSITION 10GA.**  
PART DESIGNATOR RWT02G OR RWT02B

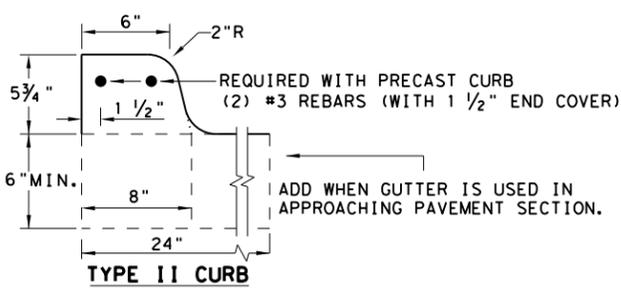
BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.  
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



NOTE: ONLY (1) 5/8" BOLT REQUIRED AT THIS POST LOCATION.

THRIE-BEAM TERMINAL - CURB TABLE	
PRECAST CURB FULL LENGTH EQUALS 12' - 2"	
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.	
CURB (1) LENGTH	5' - 8"
CURB (2) LENGTH	6' - 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7	
CONNECTING PRECAST CURB SECTIONS (1) & (2):	
FORM OR CORE	1" DIA. HOLE 9" LONG INTO EACH CURB END.
USE	(1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:	
FORM OR CORE	(4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.	

\* NOTES: NOT NEEDED FOR CAST-IN-PLACE. SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS. PERCUSSION DRILLING IS NOT PERMITTED WITH: TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.



NOTE: OPTIONS FOR TYPE II CURB:  
1. PRECAST  
2. CAST-IN-PLACE

**GENERAL NOTES**

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF (31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7' - 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

**HIGH-SPEED TRANSITION**  
**SHEET 1 OF 2**

		Design Division Standard	
<b>METAL BEAM GUARD FENCE</b> <b>THRIE-BEAM TRANSITION</b> <b>TL-3 MASH COMPLIANT</b> <b>GF (31) TR TL3-20</b>			
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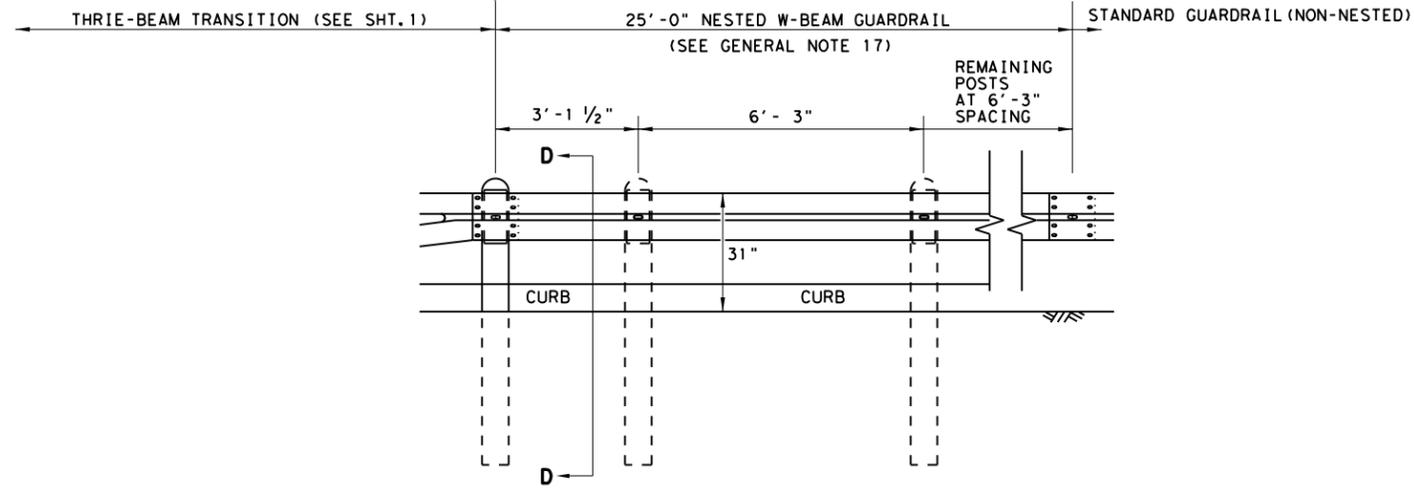
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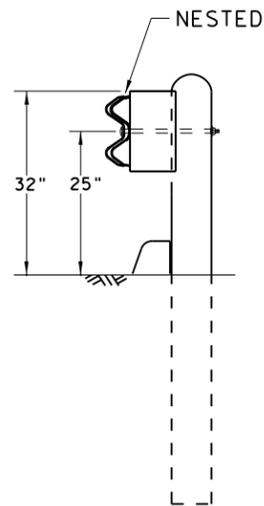
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)

END PAYMENT FOR METAL BEAM GUARD FENCE TRANSITION.  
 BEGIN PAYMENT FOR METAL BEAM GUARD FENCE.

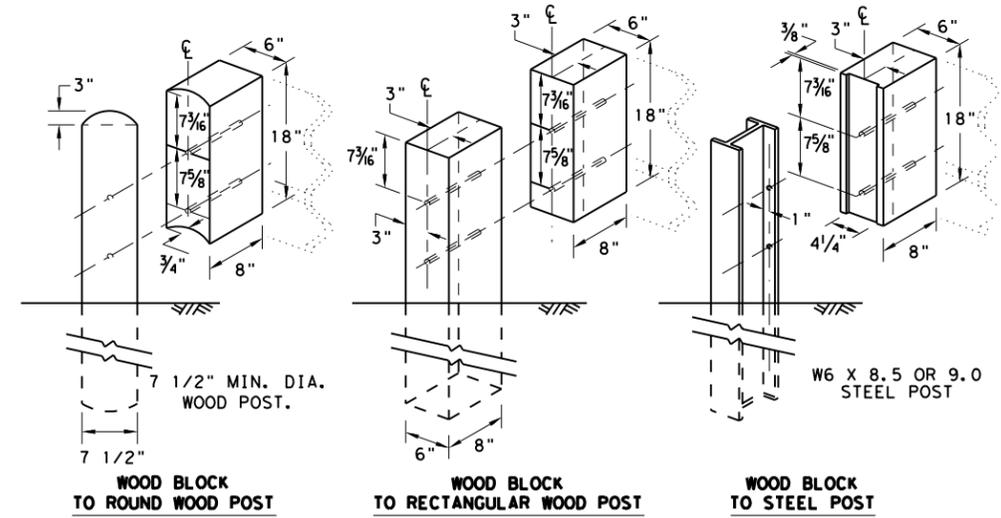
(SEE GF (31) STANDARD SHEET)



ELEVATION VIEW



SECTION D-D



THREE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

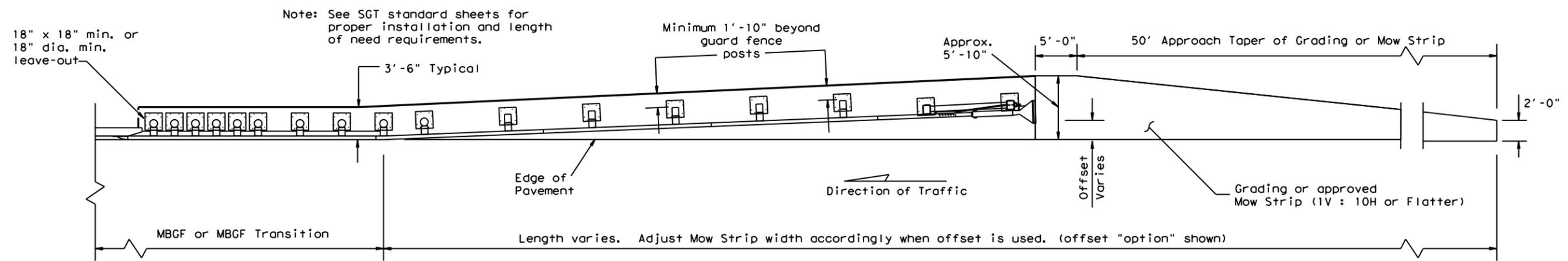


METAL BEAM GUARD FENCE  
 THREE-BEAM TRANSITION  
 TL-3 MASH COMPLIANT

GF (31) TR TL3-20

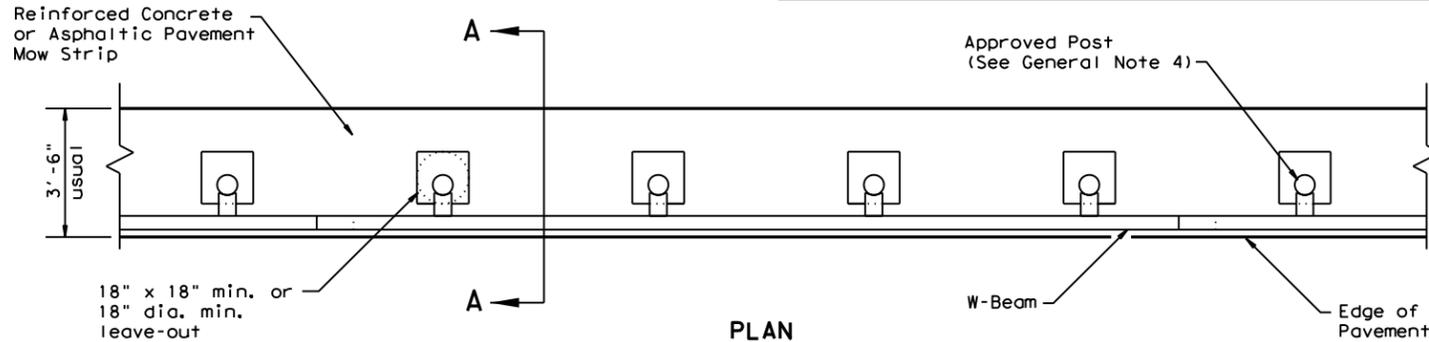
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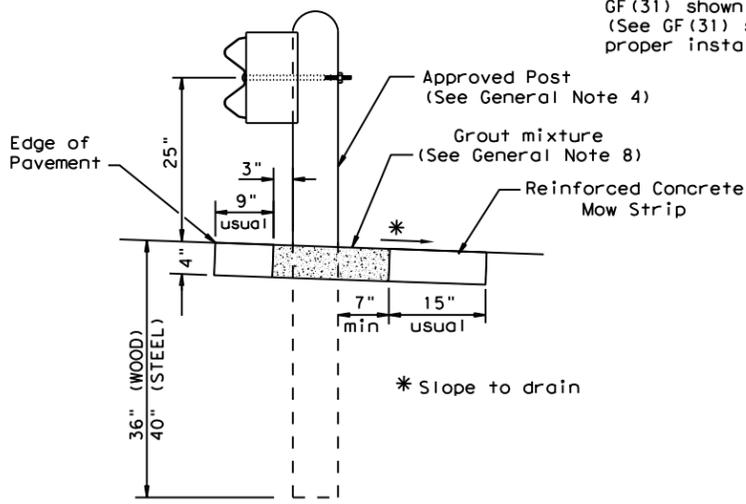
**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**

Note: Site Condition(s)  
 Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.  
 Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.



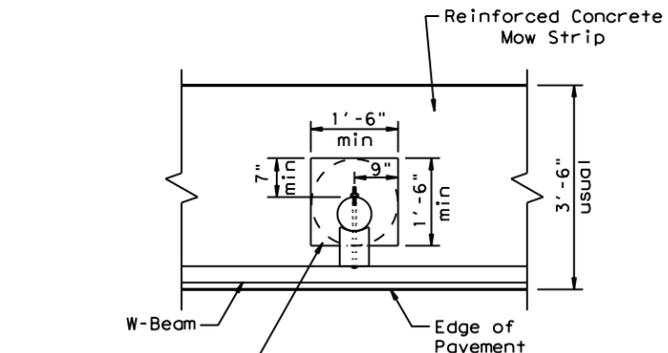
**PLAN**

GF(31) shown with Mow Strip  
 (See GF(31) standard sheet for proper installation)



**SECTION A-A**

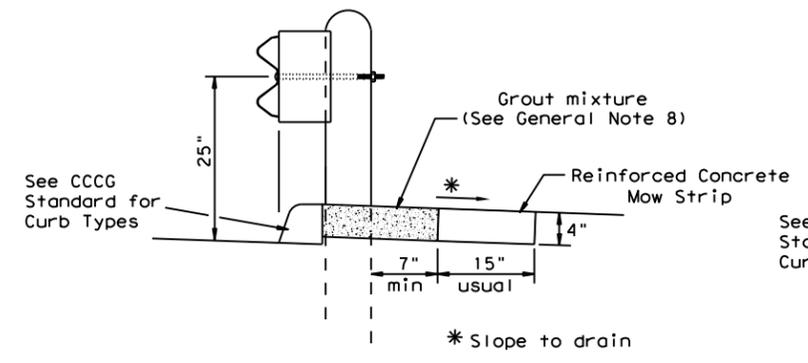
Typical



**MOW STRIP DETAIL**

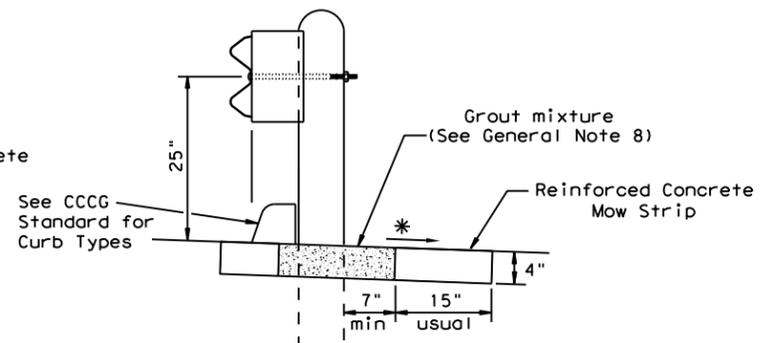
Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

- GENERAL NOTES**
1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
  2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
  3. The leave-out behind the post shall be a minimum of 7".
  4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
  5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
  6. Thickness of the mow strip will be 4".
  7. The limits of payment for reinforced concrete will include leave-outs for the posts.
  8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



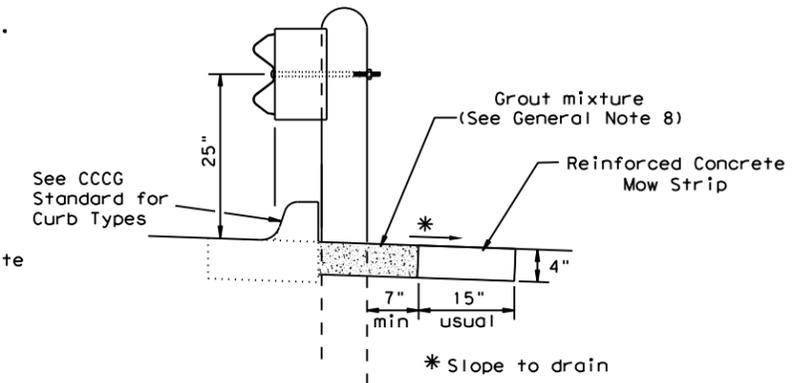
**CURB OPTION (1)**

This option will increase the post embedment throughout the system.



**CURB OPTION (2)**

Curb shown on top of mow strip

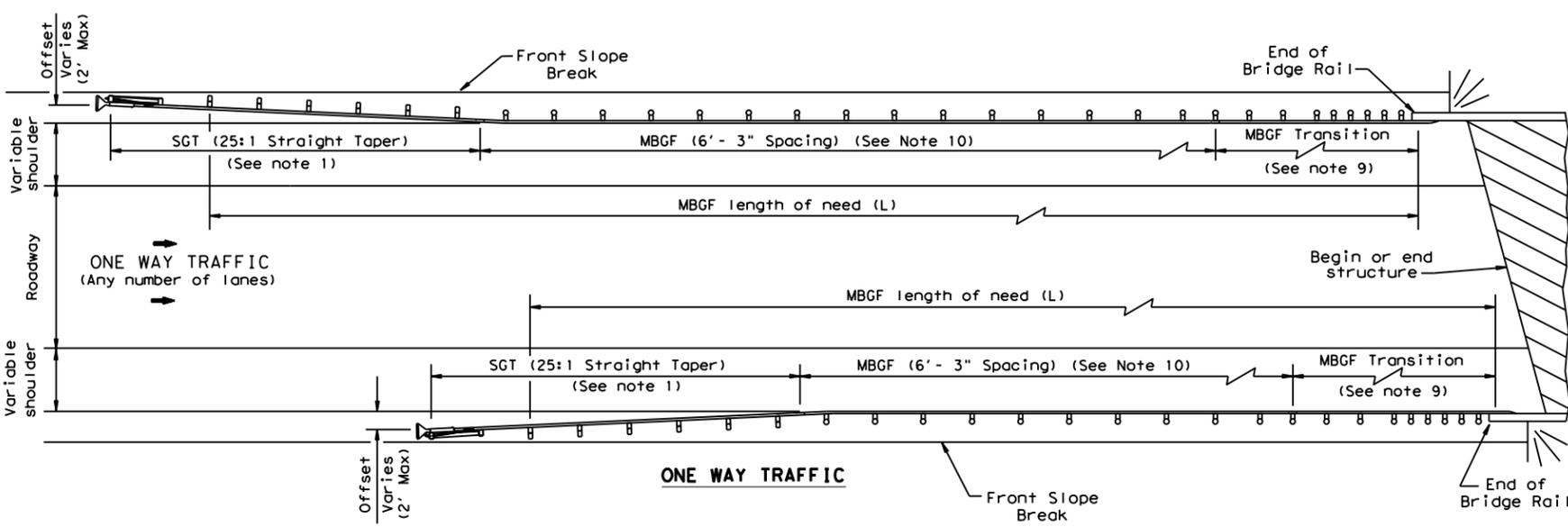
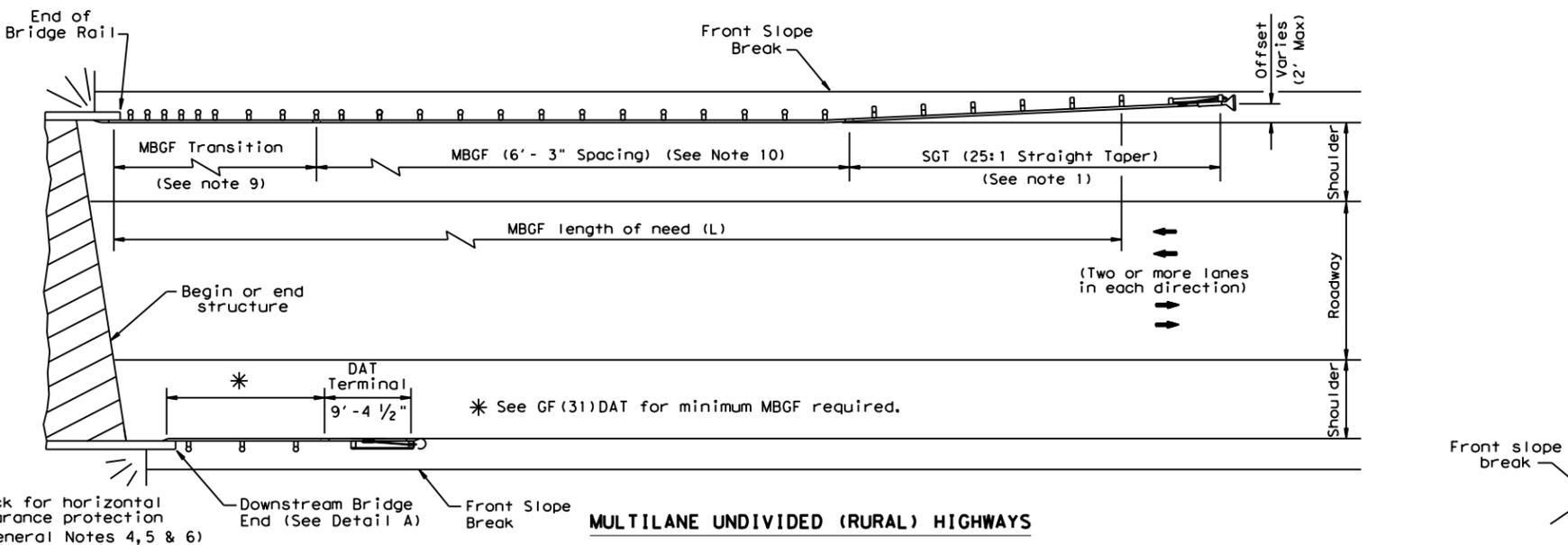
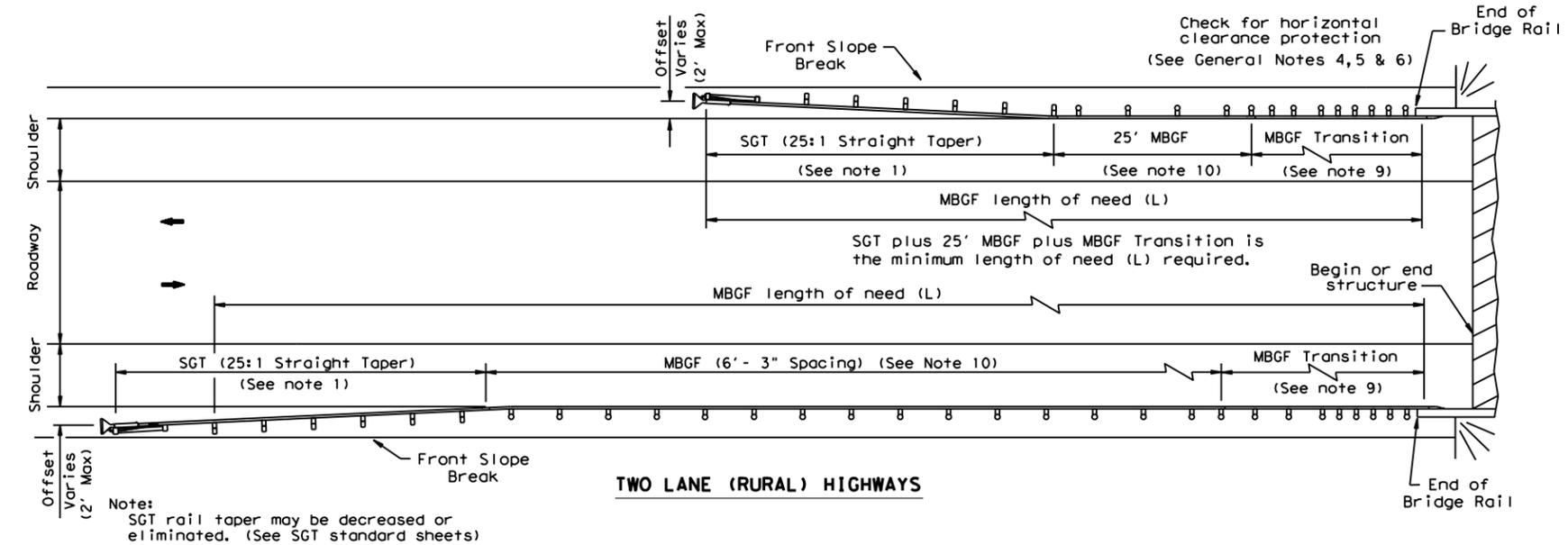


**CURB OPTION (3)**

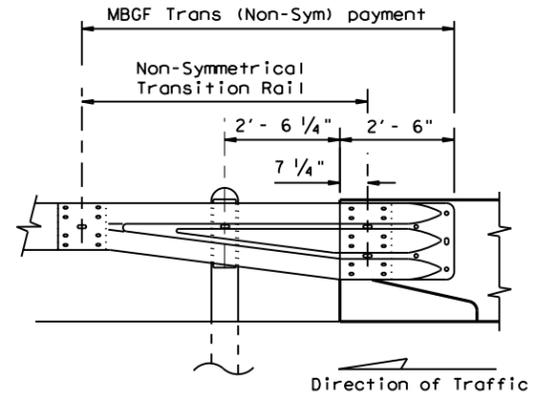
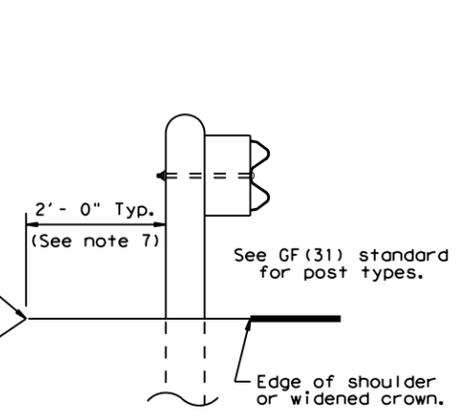
		<b>Design Division Standard</b>	
<b>METAL BEAM GUARD FENCE (MOW STRIP)</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)MS-19</b>			
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB
REVISIONS	0334	08	037
	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	33

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/6/2023 4:20:56 PM  
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- GENERAL NOTES**
- For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
  - Quantities of metal beam guard fence (MBSG) at individual bridge ends are as shown in the plans.
  - Use average daily traffic (ADT) for the current year to determine MBSG length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
  - MBSG may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBSG consideration.
  - Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
  - Direct connection of MBSG to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
  - The crown shall be widened to accommodate MBSG. Typically the "front slope" break should be 2'-0" from the back of the MBSG post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBSG).
  - For restrictive bridge widths: The MBSG should be properly transitioned from the existing bridge rail to the adjoining MBSG (See MBSG Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
  - Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
  - A minimum 25' length of MBSG will be required.



Note: All rail elements shall be lapped in the direction of adjacent traffic.

**Texas Department of Transportation** Design Division Standard

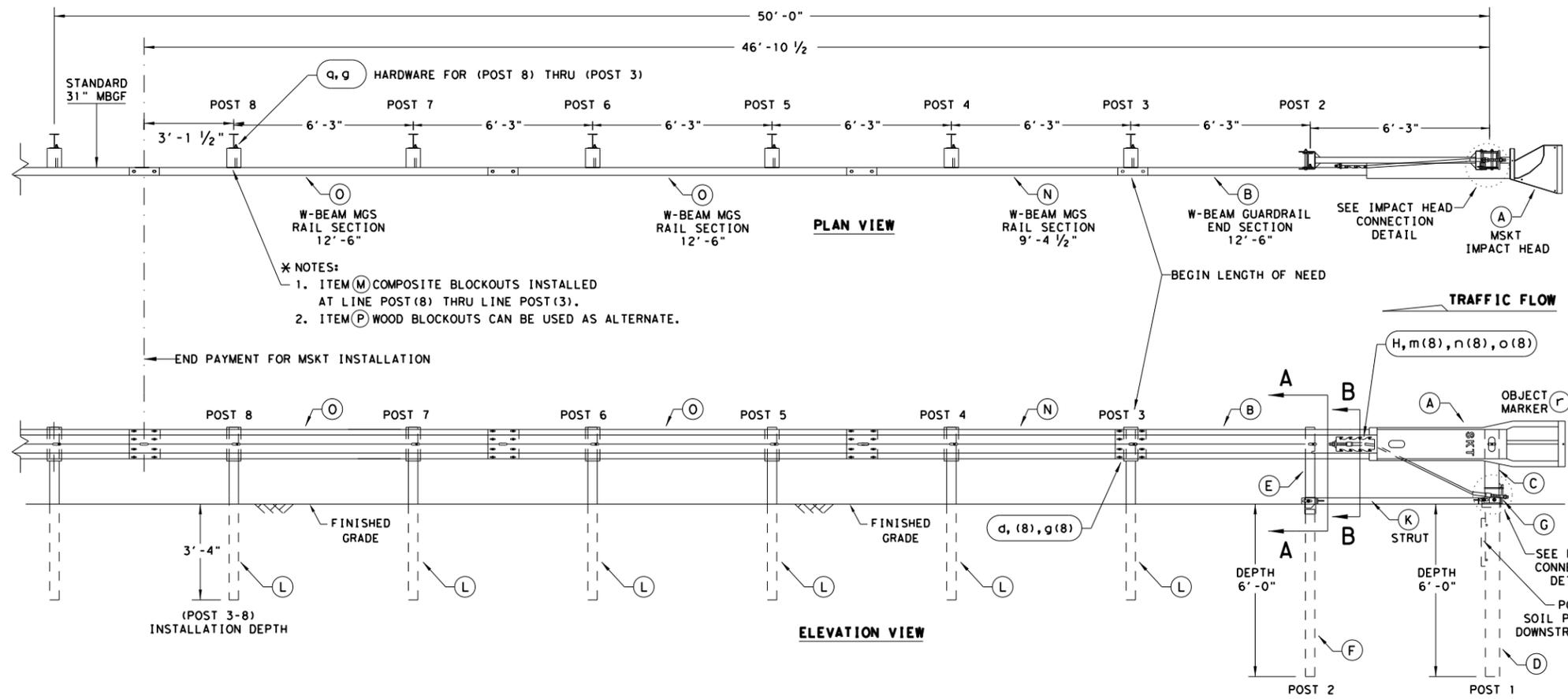
**BRIDGE END DETAILS**  
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

**BED-14**

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	34	

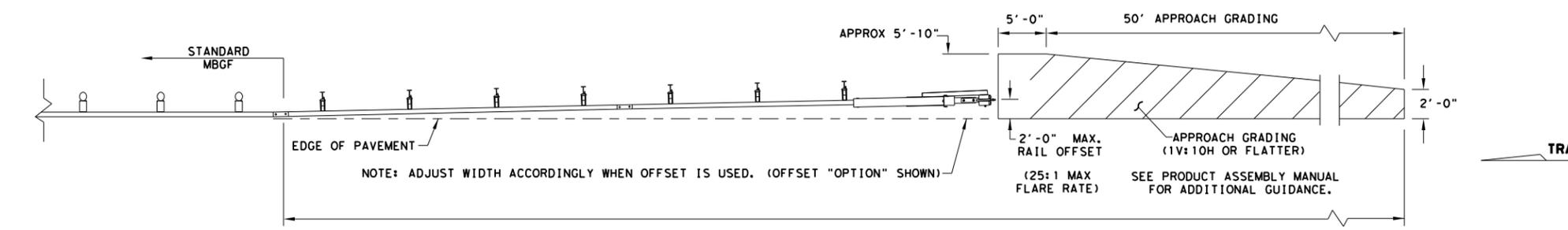
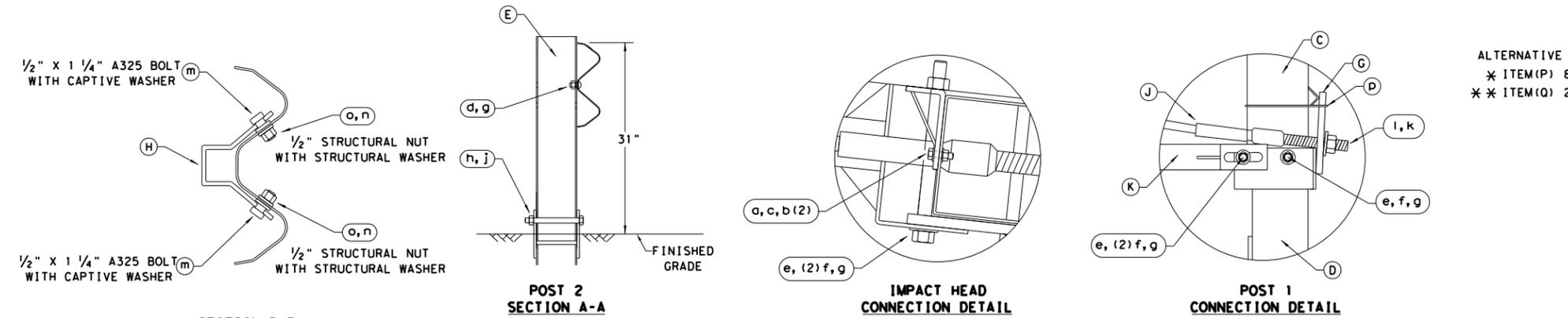
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 3/6/2023  
 FILE: c:\pwworking\kno\pwworking\new\_user (1)\d0240295\sgt12s3118.dgn



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
  - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
  - A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
  - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
  - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRoACHING ON THE SHOULDER, THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
  - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
  - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6X9 OR W6X8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
a	2	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	3/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation  
 Design Division Standard

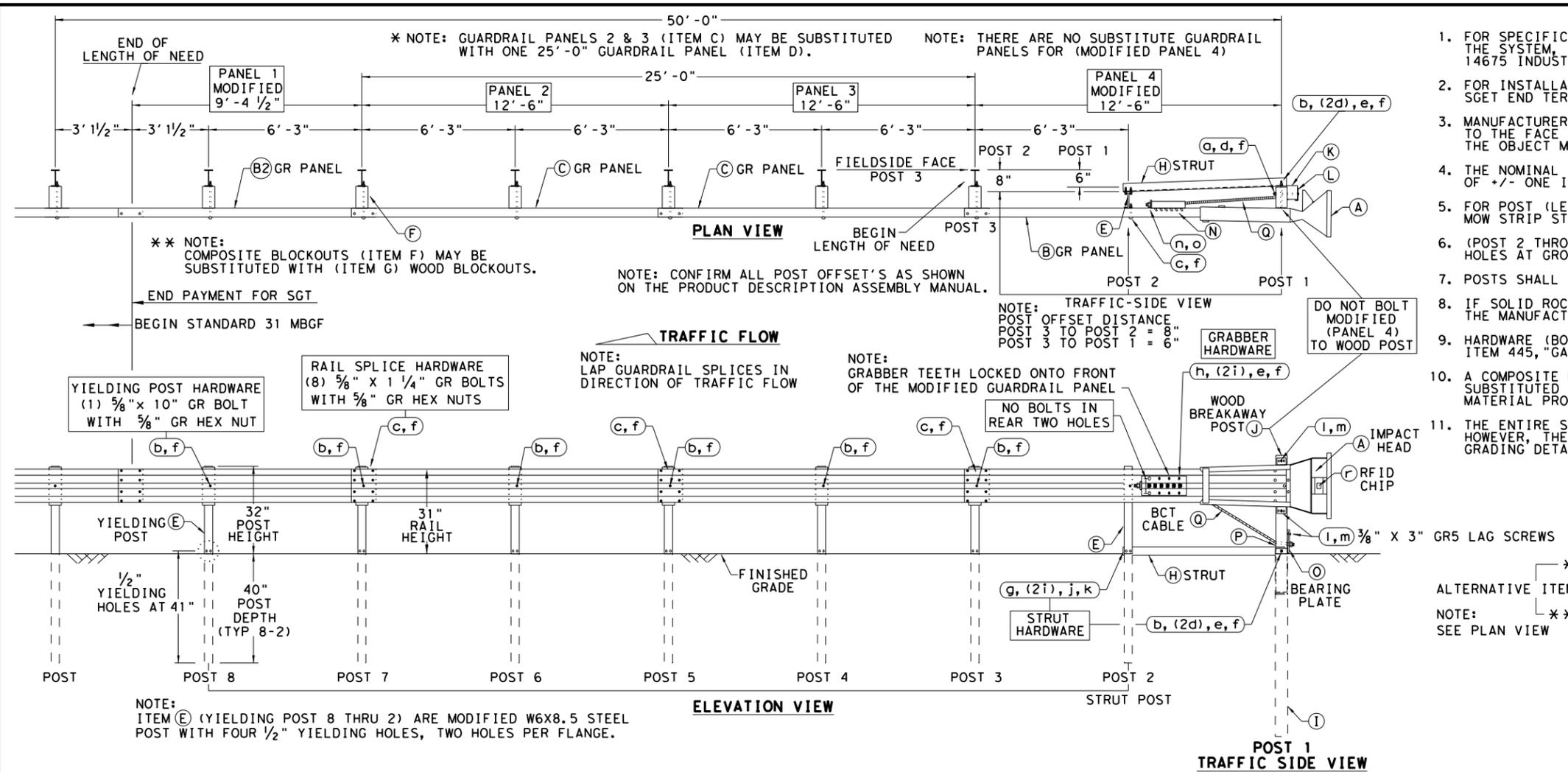
## SINGLE GUARDRAIL TERMINAL

### MSKT-MASH-TL-3

### SGT (12S) 31-18

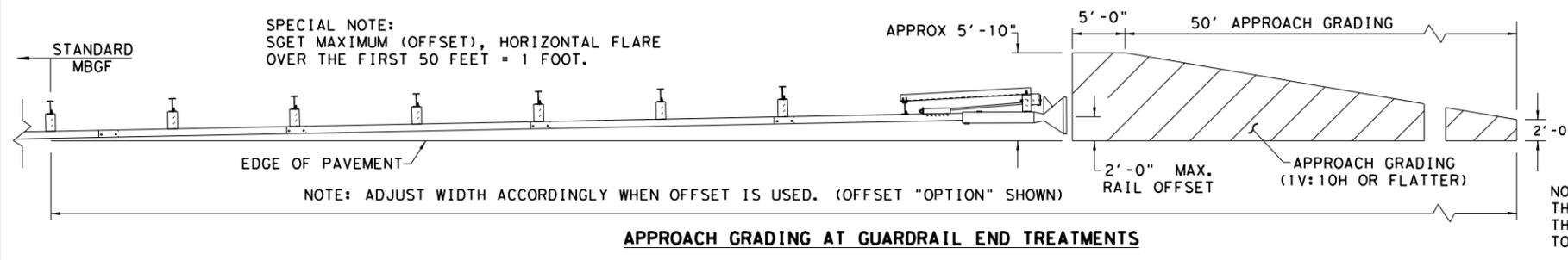
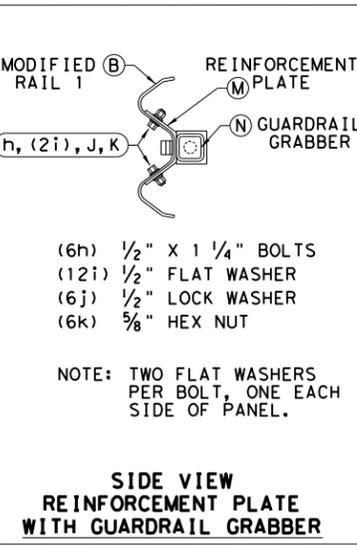
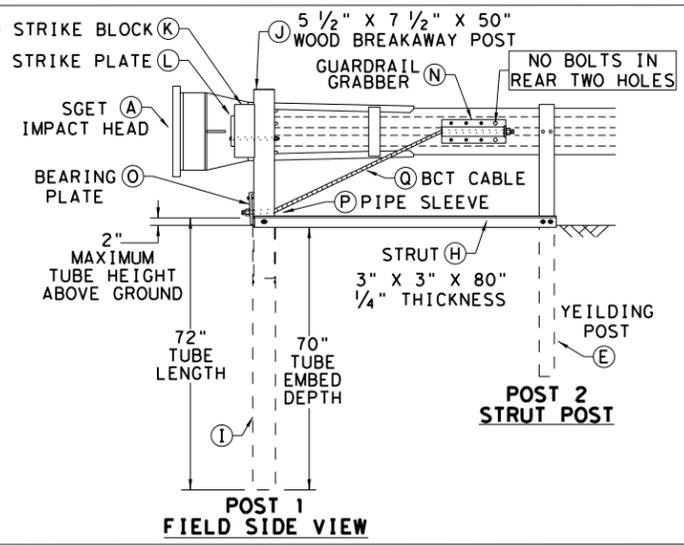
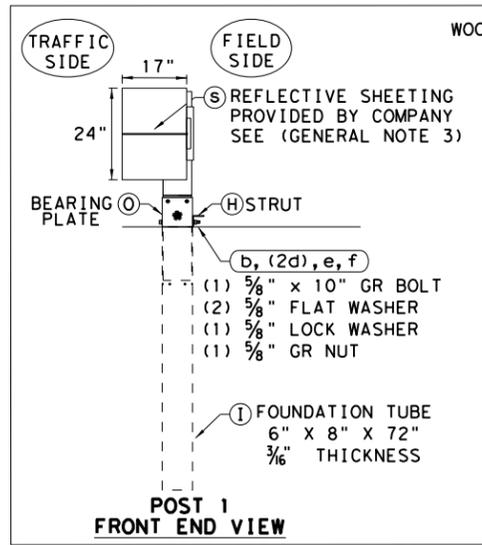
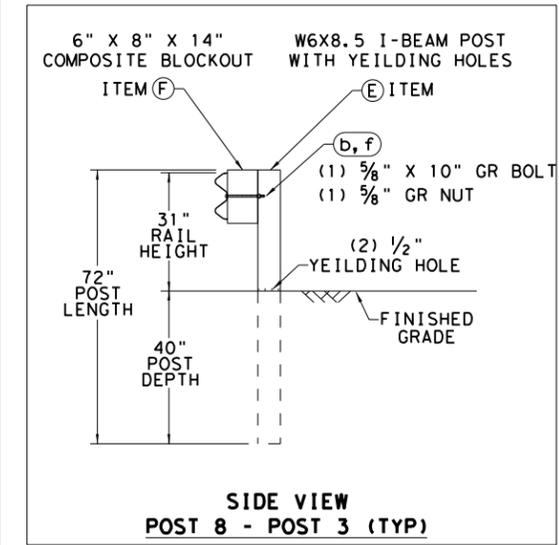
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© TXDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	35	

DATE: 3/6/2023  
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 DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
  - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

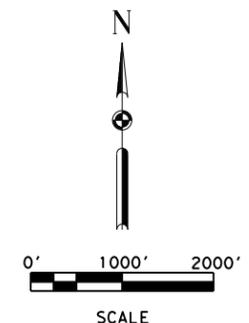
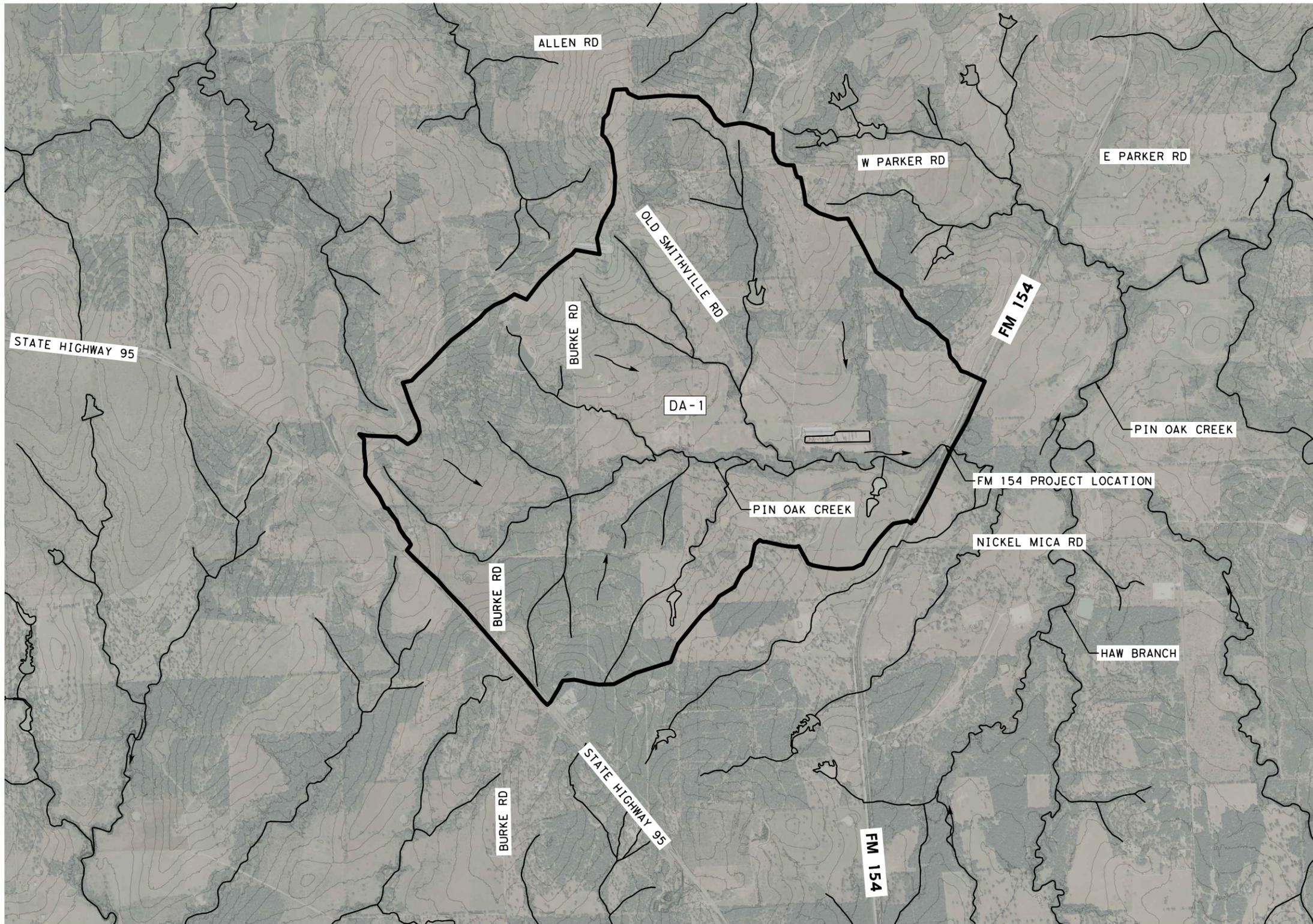
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/8"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
SMALL HARDWARE			
o	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPlice BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HD HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

**SPIG INDUSTRY, LLC**  
**SINGLE GUARDRAIL TERMINAL**  
**SGET - TL-3 - MASH**  
**SGT (15) 31-20**

FILE: sg153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 0334	SECT: 08	JOB: 037	HIGHWAY: FM 154
REVISIONS				
DIST: YKM	COUNTY: FAYETTE			SHEET NO.: 36



**LEGEND**

- DRAINAGE AREA BOUNDARY
- EXISTING CONTOURS
- FLOW ARROW
- STREAM

**NOTES:**

1. TOPOGRAPHIC INFORMATION OBTAINED FROM TEXAS NATURAL RESOURCES INFORMATION SYSTEMS (TNRIS 2016).
2. AERIAL IMAGERY USED WAS TEXAS NAIP IMAGERY 2020 ACQUIRED FROM TNRIS.
3. HEC-HMS VERSION 4.10 WAS USED FOR THE HYDROLOGIC ANALYSIS.
4. REGRESSION METHOD HAS BEEN USED AS A CHECK IN ACCORDANCE WITH TXDOT HYDRAULIC DESIGN MANUAL CHAPTER 4 SECTION 8.
5. H&H FILES WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR AMBER HIELSCHER ON OCTOBER 10, 2022.



04/24/2023



FM 154 AT PIN OAK CREEK

**DRAINAGE AREA MAP**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		37

**Hydrologic Calculations**

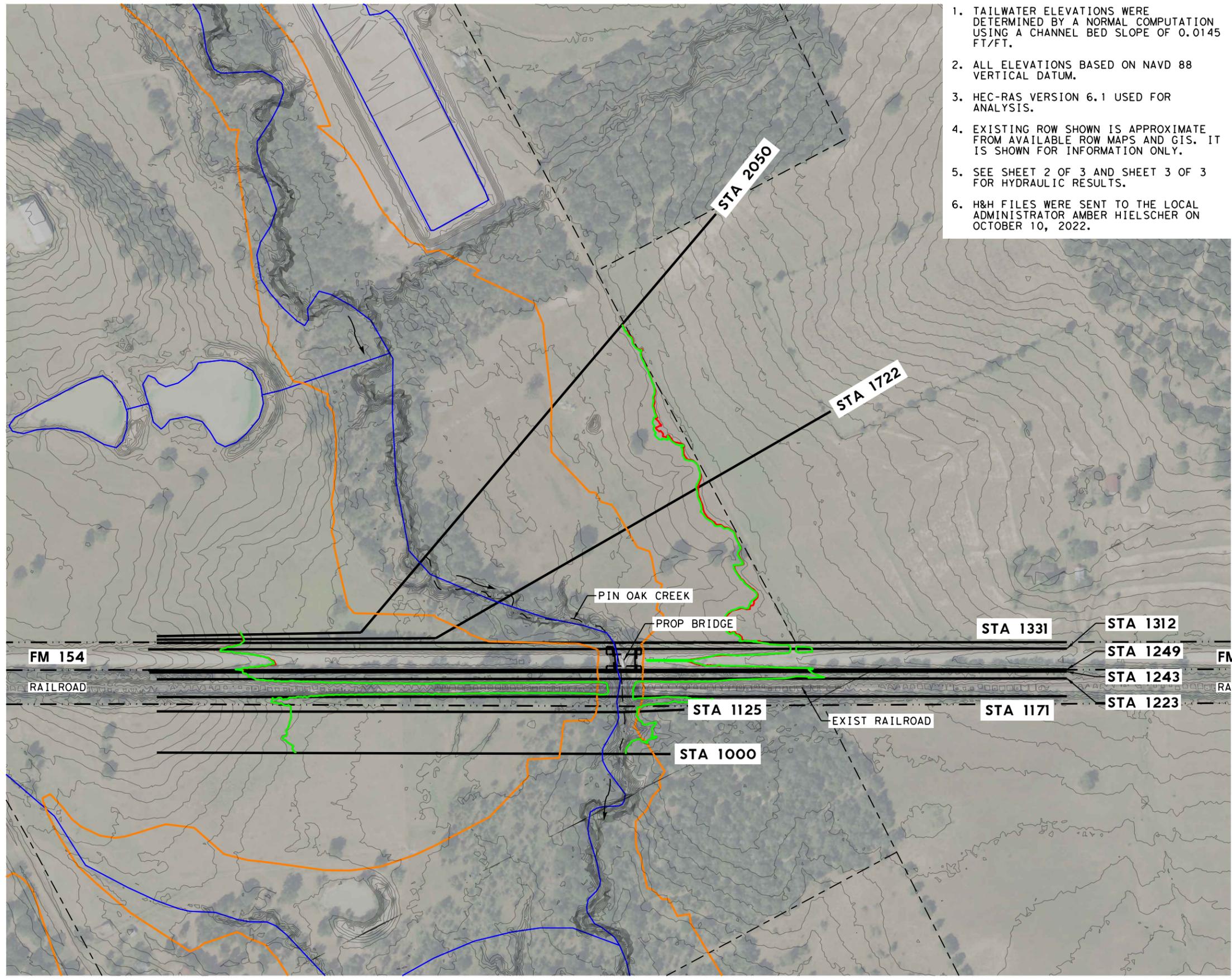
Parameter Calculations								Peak Flows					
Basin	Area (sq. mi.)	Soil Group (%)	Curve Number (CN) Description	Weighted CN	Climatic Adjustment Factor	Climatic Adjusted CN	Lag Time (min.)	2 Yr (CFS)	5 Yr (CFS)	10 Yr (CFS)	25 Yr (CFS)	50 Yr (CFS)	100 Yr (CFS)
DA-1	2.4847	88% D 12% C	57% Pasture - Good 42% Brush - Good 1% Impervious	76.4	-10.0	66.4	90.5	582	1011	1437	2086	2617	3211

Frequency (Yr)	* Atlas 14 Rainfall (inches)
2	4.29
5	5.67
10	7.02
25	9.10
50	10.9
100	13.1

\* 24-HOUR DURATION

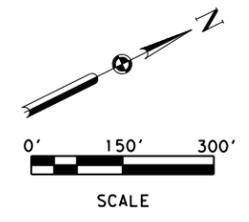
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 PLOTTED: 3/6/2023 4:21:50 PM



**NOTES:**

1. TAILWATER ELEVATIONS WERE DETERMINED BY A NORMAL COMPUTATION USING A CHANNEL BED SLOPE OF 0.0145 FT/FT.
2. ALL ELEVATIONS BASED ON NAVD 88 VERTICAL DATUM.
3. HEC-RAS VERSION 6.1 USED FOR ANALYSIS.
4. EXISTING ROW SHOWN IS APPROXIMATE FROM AVAILABLE ROW MAPS AND GIS. IT IS SHOWN FOR INFORMATION ONLY.
5. SEE SHEET 2 OF 3 AND SHEET 3 OF 3 FOR HYDRAULIC RESULTS.
6. H&H FILES WERE SENT TO THE LOCAL ADMINISTRATOR AMBER HIELSCHER ON OCTOBER 10, 2022.



**LEGEND**

- FLOW ARROW
- HEC-RAS CROSS SECTION
- - - HEC-RAS CREEKLINE
- - - EXISTING RIGHT OF WAY (ROW)
- - - PROPERTY LINE
- 100 YEAR EFFECTIVE FEMA FLOODPLAIN (ZONE A, MAP #48149C0400C, EFFECTIVE OCTOBER 17, 2006)
- 100 YEAR PRE PROJECT FLOODPLAIN
- 100 YEAR POST PROJECT FLOODPLAIN
- FEMA EFFECTIVE STREAMLINE



03/07/2023

*Hayden Morris*

**Kimley»Horn** F-928



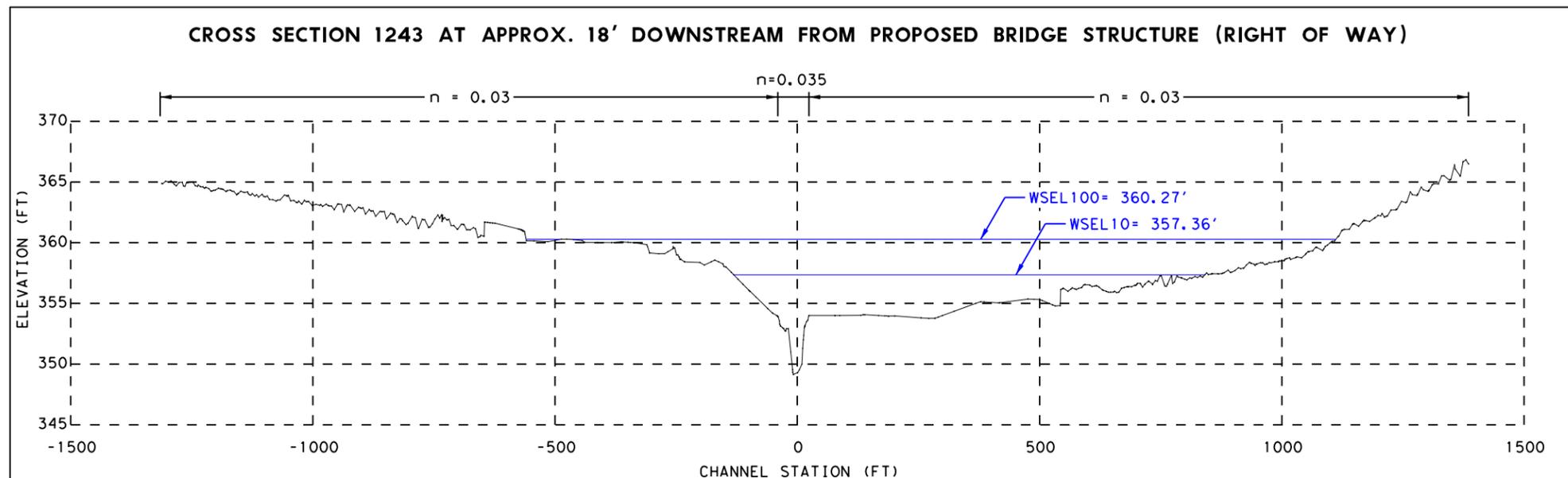
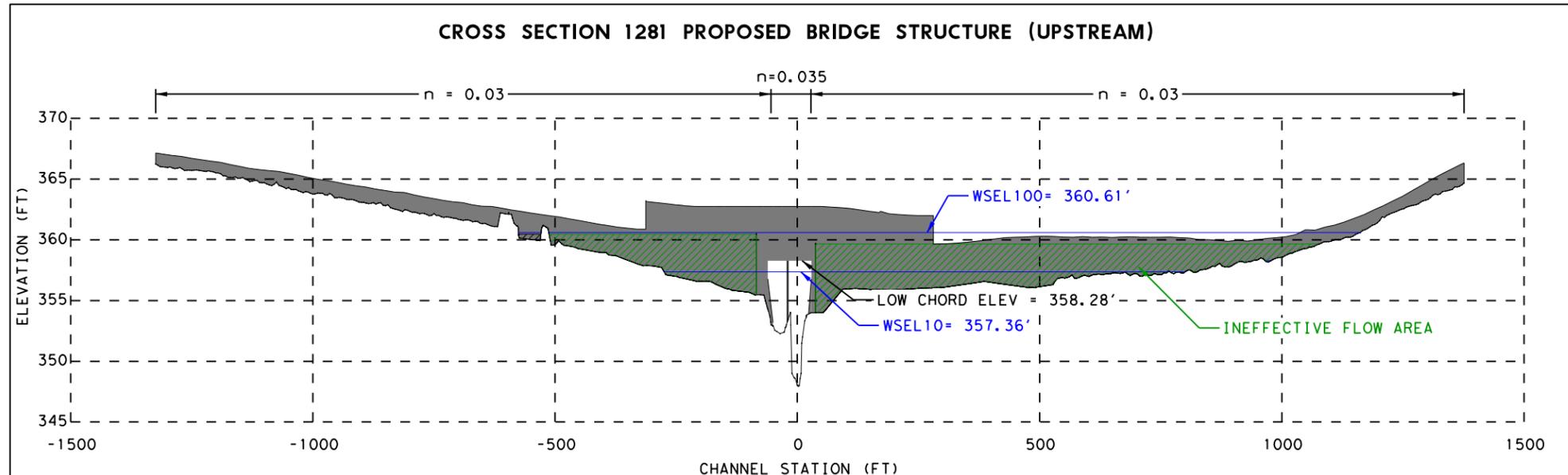
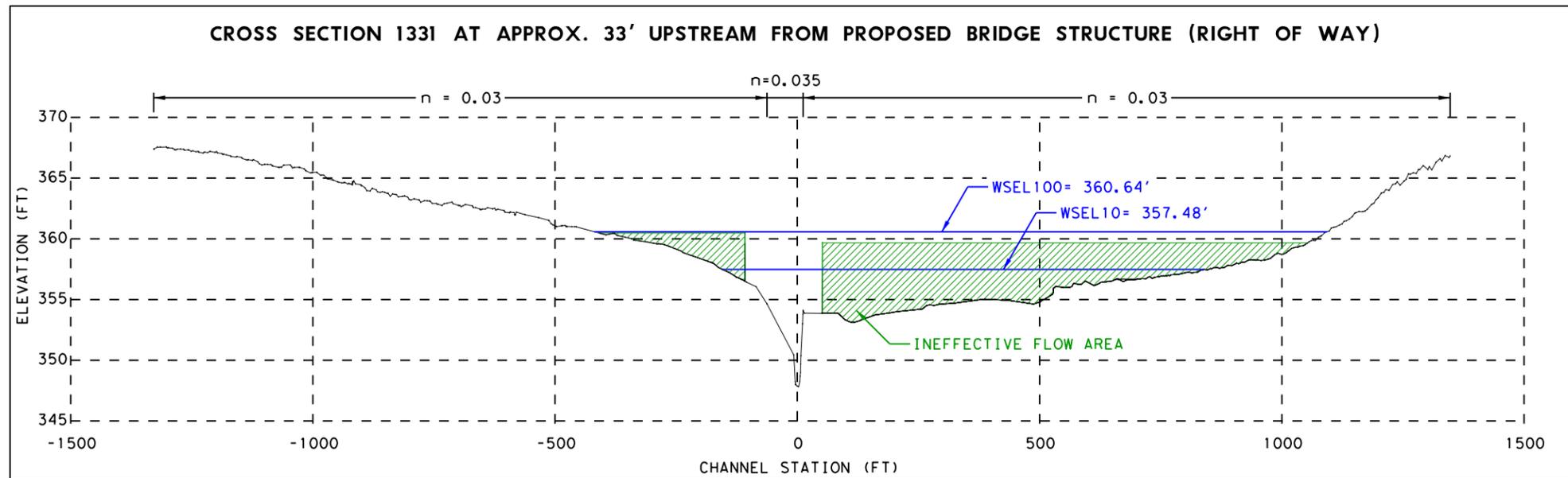
FM 154 AT PIN OAK CREEK

**HYDRAULIC DATA SHEET**

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YOAKUM	FAYETTE	38
CONT.	SECT.	JOB	
0334	08	037	

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03/07/2023

*Hayden Morris*

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

**HYDRAULIC  
DATA SHEET**

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		39

Water Surface Elevation Comparison				
Cross Section		Pre-Project	Post-Project	Difference
10-Year				
2050		357.70	357.64	-0.06
1722		357.68	357.62	-0.06
1331	ROW	357.55	357.48	-0.07
1312		357.51	357.45	-0.06
FM 154 BRIDGE	US	357.34	357.36	0.02
	DS	357.26	357.27	0.01
1249		357.26	357.26	0.00
1243	ROW	357.36	357.36	0.00
1223		357.05	357.05	0.00
RR BRIDGE	US	356.85	356.85	0.00
	DS	356.46	356.46	0.00
1171		356.43	356.43	0.00
1125		356.37	356.37	0.00
1000		355.44	355.44	0.00

Velocity Comparison			
Cross Section		Pre-Project	Post-Project
10-Year			
2050		1.25	1.29
1722		1.29	1.33
1331	ROW	2.38	2.41
1312		2.63	2.63
FM 154 BRIDGE	US	3.80	3.19
	DS	4.04	3.66
1249		3.63	3.56
1243	ROW	0.92	0.92
1223		3.98	3.98
RR BRIDGE	US	4.84	4.84
	DS	6.14	6.14
1171		5.99	5.99
1125		5.40	5.40
1000		8.02	8.02

Water Surface Elevation Comparison				
Cross Section		Pre-Project	Post-Project	Difference
100-Year				
2050		360.82	360.75	-0.07
1722		360.81	360.74	-0.07
1331	ROW	360.68	360.64	-0.04
1312		360.64	360.61	-0.03
FM 154 BRIDGE	US	360.64	360.53	-0.11
	DS	360.53	360.42	-0.11
1249		360.07	360.16	0.09
1243	ROW	360.27	360.27	0.00
1223		359.70	359.70	0.00
RR BRIDGE	US	359.35	359.35	0.00
	DS	357.37	357.37	0.00
1171		357.38	357.38	0.00
1125		357.52	357.52	0.00
1000		356.48	356.48	0.00

Velocity Comparison			
Cross Section		Pre-Project	Post-Project
100-Year			
2050		0.78	0.80
1722		0.91	0.93
1331	ROW	3.01	2.88
1312		3.15	3.01
FM 154 BRIDGE	US	4.02	3.42
	DS	4.61	4.06
1249		5.21	4.19
1243	ROW	0.74	0.74
1223		5.37	5.37
RR BRIDGE	US	6.54	6.54
	DS	10.89	10.89
1171		10.76	10.76
1125		8.11	8.11
1000		10.60	10.60

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*Hayden Morris*

03/07/2023



FM 154 AT PIN OAK CREEK

## HYDRAULIC DATA SHEET

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		40

**25 YEAR SCOUR CALCULATIONS  
PIER SCOUR COMPUTATION RESULTS**

FREQ (yrs)	K <sub>c</sub>	K <sub>a</sub>	K <sub>s</sub>	Y <sub>1</sub>	a	Fr <sub>1</sub>	V*	y <sub>1</sub>	REDUCTION FACTOR	Y <sub>s</sub> * REDUCTION FACTOR
25	1.0	1.3	1.1	9.6	2.0	0.21	3.61	5.14	0.50	2.57

\*VELOCITY IS THE VELOCITY AT THE PIER FROM HEC-RAS FLOW DISTRIBUTION ASSUMING MAXIMUM FLOW VELOCITY IN SECTION

**CONTRACTION SCOUR COMPUTATION RESULTS**

FREQ (yrs)	Q <sub>1</sub> (cfs)	Q <sub>2</sub> (cfs)	W <sub>1</sub> (ft)	W <sub>2</sub> (ft)	y <sub>1</sub> (ft)	y <sub>2</sub> (ft)	y <sub>c</sub> (ft)	y <sub>s</sub> (ft)
25	1385.4	2048.2	74.8	84.0	6.96	8.98	2.02	1.24

**50 YEAR SCOUR CALCULATIONS  
PIER SCOUR COMPUTATION RESULTS**

FREQ (yrs)	K <sub>c</sub>	K <sub>a</sub>	K <sub>s</sub>	Y <sub>1</sub>	a	Fr <sub>1</sub>	V*	y <sub>1</sub>	REDUCTION FACTOR	Y <sub>s</sub> * REDUCTION FACTOR
50	1.0	1.3	1.1	10.6	2.0	0.20	3.73	5.29	0.50	2.64

\*VELOCITY IS THE VELOCITY AT THE PIER FROM HEC-RAS FLOW DISTRIBUTION ASSUMING MAXIMUM FLOW VELOCITY IN SECTION

**CONTRACTION SCOUR COMPUTATION RESULTS**

FREQ (yrs)	Q <sub>1</sub> (cfs)	Q <sub>2</sub> (cfs)	W <sub>1</sub> (ft)	W <sub>2</sub> (ft)	y <sub>1</sub> (ft)	y <sub>2</sub> (ft)	y <sub>c</sub> (ft)	y <sub>s</sub> (ft)
50	2080.0	2552.7	74.8	84.0	7.97	8.77	0.80	1.87

**PIER SCOUR ANALYSIS**

USING HEC-18 EQ 7.1

$$y_s = 2.0 * K_c * K_a * K_s * y_1 * (a / y_1^{1.49} * Fr_{1,0.85})$$

WHERE:

y<sub>s</sub> = PIER SCOUR DEPTH (FT)

K<sub>c</sub> = CORRECTION FACTOR FOR PIER NOSE SHAPE (FOR A GROUP OF CYLINDERS, K<sub>c</sub> = 1.0)

K<sub>a</sub> = CORRECTION FACTOR FOR ANGLE OF ATTACK (ANGLE OF ATTACK = 8°)

K<sub>s</sub> = CORRECTION FACTOR FOR BED CONDITION (DUNE HEIGHT < 10', K<sub>s</sub> = 1.1)

y<sub>1</sub> = FLOW DEPTH DIRECTLY UPSTREAM OF THE PIER (FT)

a = PIER WIDTH (FT)

Fr<sub>1</sub> = V / (g \* Y<sub>1</sub><sup>3</sup>) = FROUDE NUMBER UPSTREAM OF PIER, WHERE V = VELOCITY AT PIER (FT / SEC),

AND g = 32.2 FT / SEC<sup>2</sup> (GRAVITATIONAL CONSTANT)

**LIVE BED CONTRACTION SCOUR ANALYSIS**

USING HEC-18 EQ 6.2 AND 6.14

$$y_c / y_1 = (Q_2 / Q_1)^{0.25} * (W_1 / W_2)^{0.25} \quad \text{and} \quad y_c = y_2 - y_1 \quad \text{and} \quad y_s = y_c + t - h_1$$

WHERE:

y<sub>c</sub> = AVERAGE CONTRACTION SCOUR DEPTH

y<sub>1</sub> = AVERAGE DEPTH IN MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

y<sub>2</sub> = AVERAGE DEPTH IN CONTRACTED SECTION

Q<sub>1</sub> = FLOW IN UPSTREAM CHANNEL TRANSPORTING SEDIMENT

Q<sub>2</sub> = FLOW IN CONTRACTED CHANNEL

W<sub>1</sub> = BOTTOM WIDTH OF MAIN CHANNEL UPSTREAM OF CONTRACTED SECTION

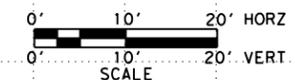
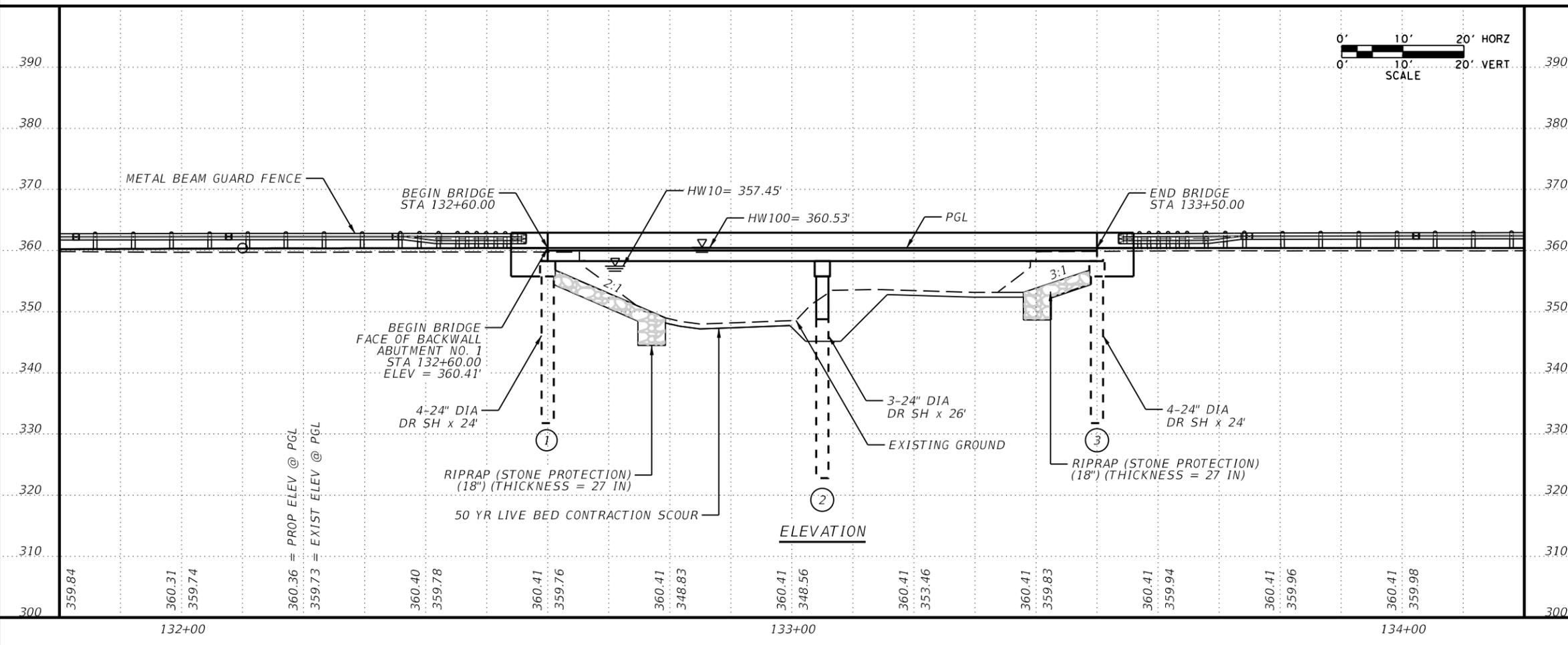
W<sub>2</sub> = BOTTOM WIDTH OF CONTRACTED SECTION LESS THE CUMULATIVE WIDTH OF PIERS

y<sub>s</sub> = PRESSURE SCOUR DEPTH

**NOTES:**

- SCOUR ANALYSIS IS BASED ON TXDOT GEOTECHNICAL MANUAL AND FHWA HEC-18 "EVALUATING SCOUR AT BRIDGES".
- THE D50 SOIL PARTICLE SIZE FOR THIS PROJECT IS THE MINIMUM SIZE ALLOWED BY THE GEOTECHNICAL MANUAL (D50=0.007874').
- ACCORDING TO THE SECTION 6 OF THE TXDOT GEOTECHNICAL MANUAL, A REDUCTION FACTOR OF 0.5 WAS APPLIED TO THE PIER SCOUR CALCULATION AS THE SOIL WAS FOUND TO BE MORE THAN 11% CLAY.

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03/22/2023

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

**SCOUR ANALYSIS**

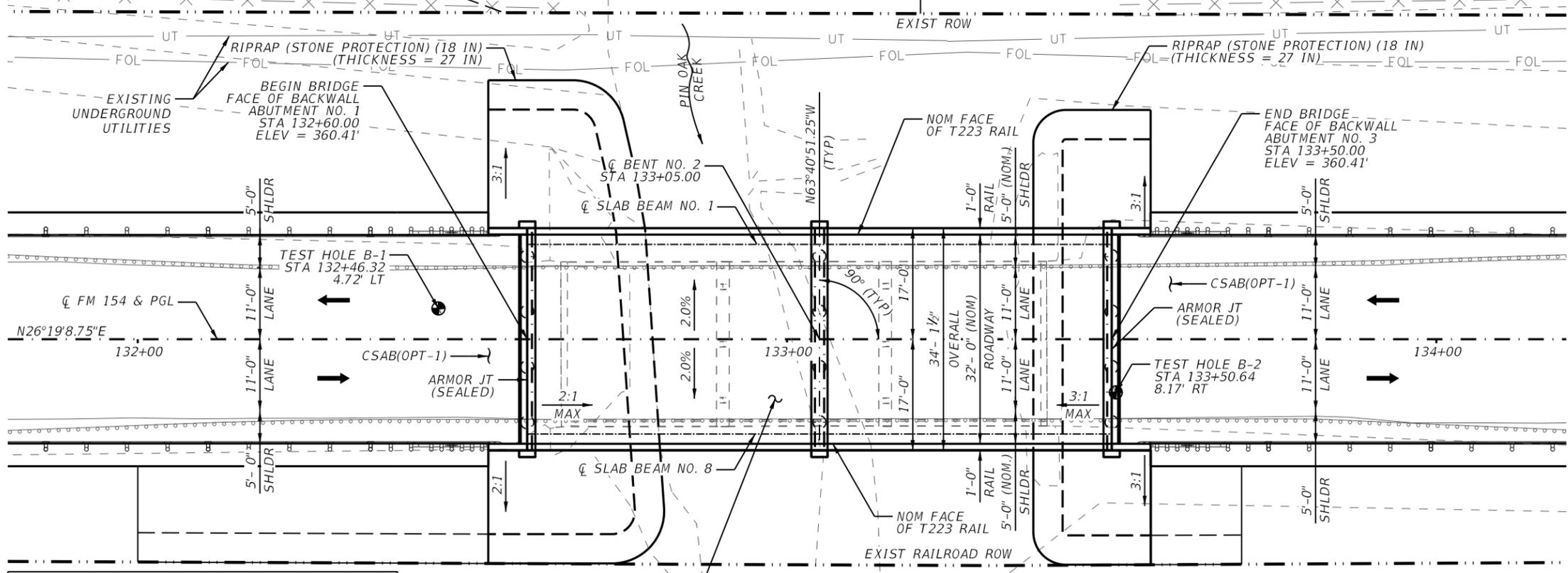
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		41



- NOTES:**
- DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (JAN. 2023).
  - ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
  - VERIFY ALL DIMENSIONS IN THE FIELD PRIOR TO CONSTRUCTION.
  - CONTRACTOR SHALL FIELD VERIFY LOCATIONS OF ALL STRUCTURES AND UTILITIES PRIOR TO ORDERING MATERIALS AND NOTIFY ENGINEER IN WRITING OF ANY CONFLICTS OR DISCREPANCIES.
  - SEE BRIDGE TYPICAL SECTIONS SHEET FOR ADDITIONAL INFORMATION.
  - SEE BORING LOG SHEET FOR ADDITIONAL BORING LOG INFORMATION.
  - EXISTING BRIDGE SUPERSTRUCTURE AND SUBSTRUCTURE TO BE REMOVED TO 2' BELOW FINISHED GRADE.

DESIGN SPEED: 60 MPH  
 EXIST ADT: 684 (2020)  
 PROP ADT: 944 (2040)  
 FUNCTIONAL CLASS: RURAL MAJOR COLLECTOR  
 EXIST NBI: 13-076-0-0334-08-022  
 PROP NBI: 13-076-0-0334-08-076

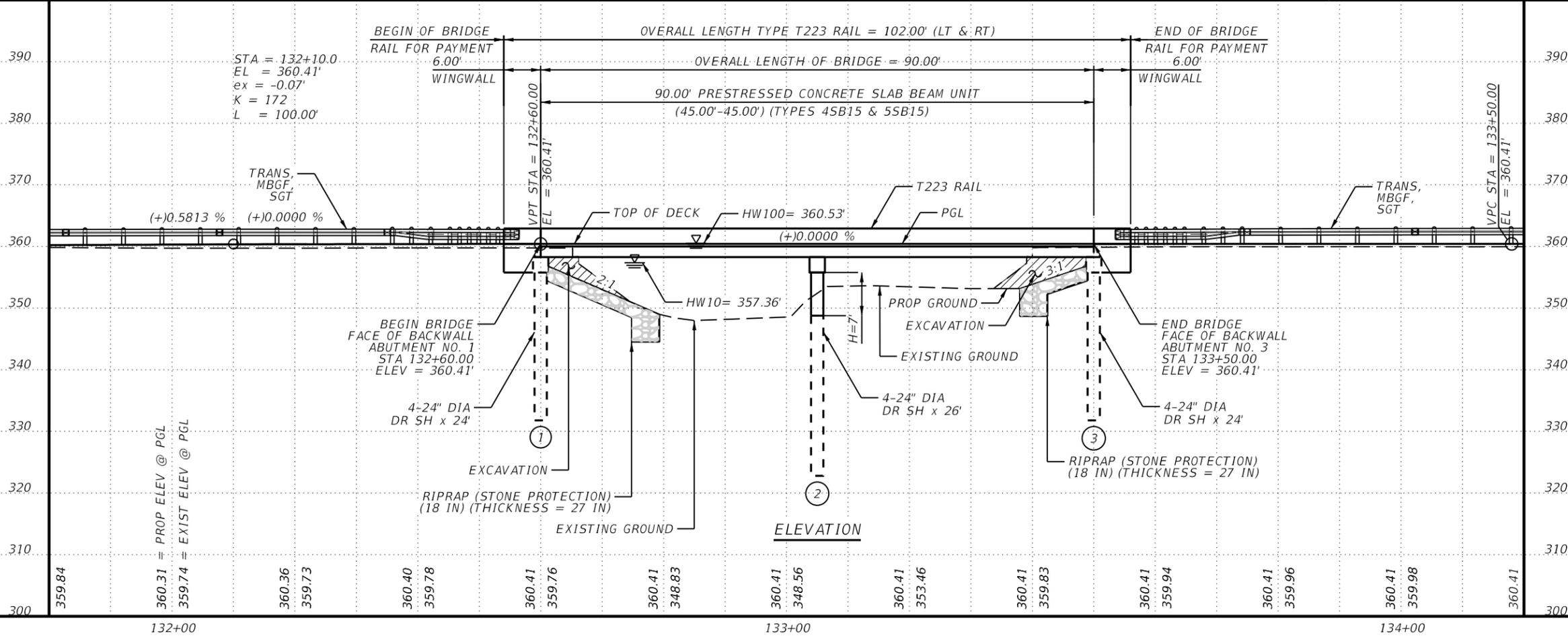


**BRIDGE HYDRAULIC DATA TABLE**

	Q TOTAL	VEL CHNL	H.W. ELEV
	(cfs)	(fps)	(ft)
DESIGN FLOW			
10 YR	1437	3.2	357.36
100 YR	3211	3.4	360.53

EXISTING 75' X 25'-4" WIDE BRIDGE (3 CONCRETE SLAB SPANS) ON CONCRETE CAPS & STEEL PILING TO BE REMOVED  
 EXIST NBI: 13-076-0-0334-08-022

PLAN



03/22/2023

*Ryan C. Laurent*

**Kimley Horn** F-928

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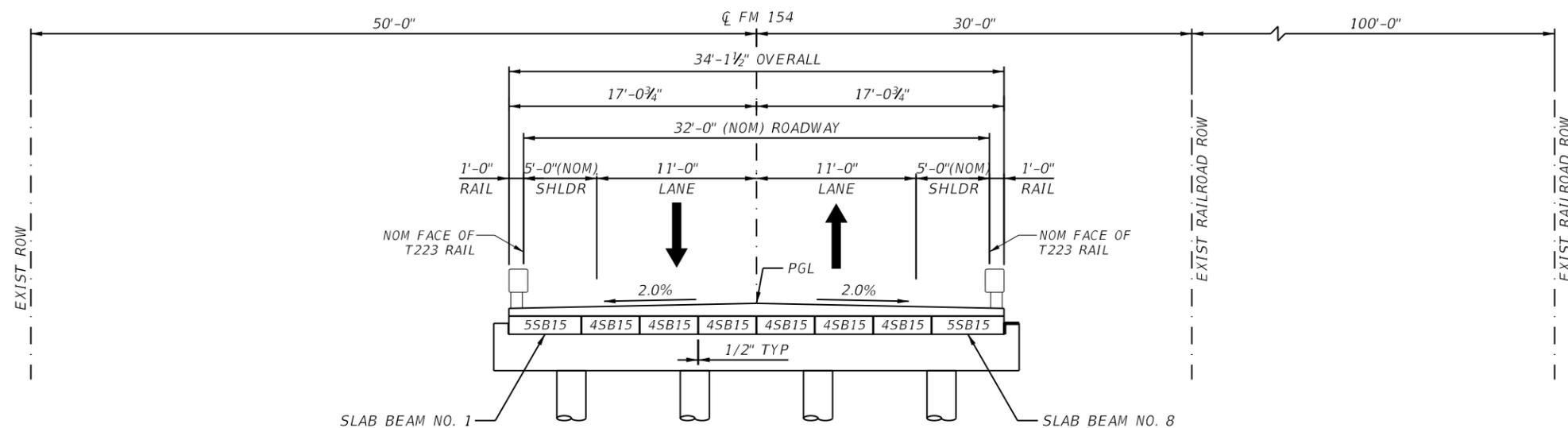
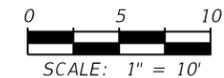
FM 154 AT PIN OAK CREEK

**BRIDGE LAYOUT**

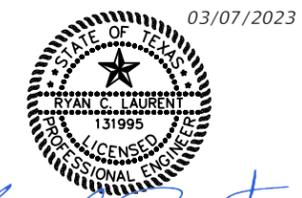
SHEET 1 OF 1

FED RD DIV NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		
42		

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PROPOSED BRIDGE SECTION



*Ryan C. Laurent*

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

BRIDGE  
TYPICAL SECTION

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	
TEXAS	YOAKUM	FAYETTE	
CONT.	SECT.	JOB	
0334	08	037	
			SHEET NO. 43

**SUMMARY OF ESTIMATED QUANTITIES - FM 154 AT PIN OAK CREEK**

BRIDGE ELEMENT NBI#: 13-076-0-0334-08-076  BID ITEM DESCRIPTION	400	416	420	420	420	422	425	425	432	450	454
	CEM STABIL BKFL	DRILL SHAFT (24 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB	PRESTR CONC SLAB BEAM (4SB15)	PRESTR CONC SLAB BEAM (5SB15)	RIPRAP (STONE PROTECTION) (18 IN)	RAIL (TY T223)	ARMOR JOINT (SEALED)
	CY	LF	CY	CY	CY	SF	LF	LF	CY	LF	LF
2 - ABUTMENTS	42	192	24.4						342	24.0	67
1 - BENT		104		11.3	3.8						
1 - 90.00' PRESTR CONC SLAB BEAM UNIT						3,071	534.00	178.00		180.0	
<b>TOTAL</b>	<b>42</b>	<b>296</b>	<b>24.4</b>	<b>11.3</b>	<b>3.8</b>	<b>3,071</b>	<b>534.00</b>	<b>178.00</b>	<b>342</b>	<b>204.0</b>	<b>67</b>

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03/22/2023

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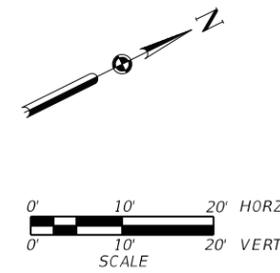
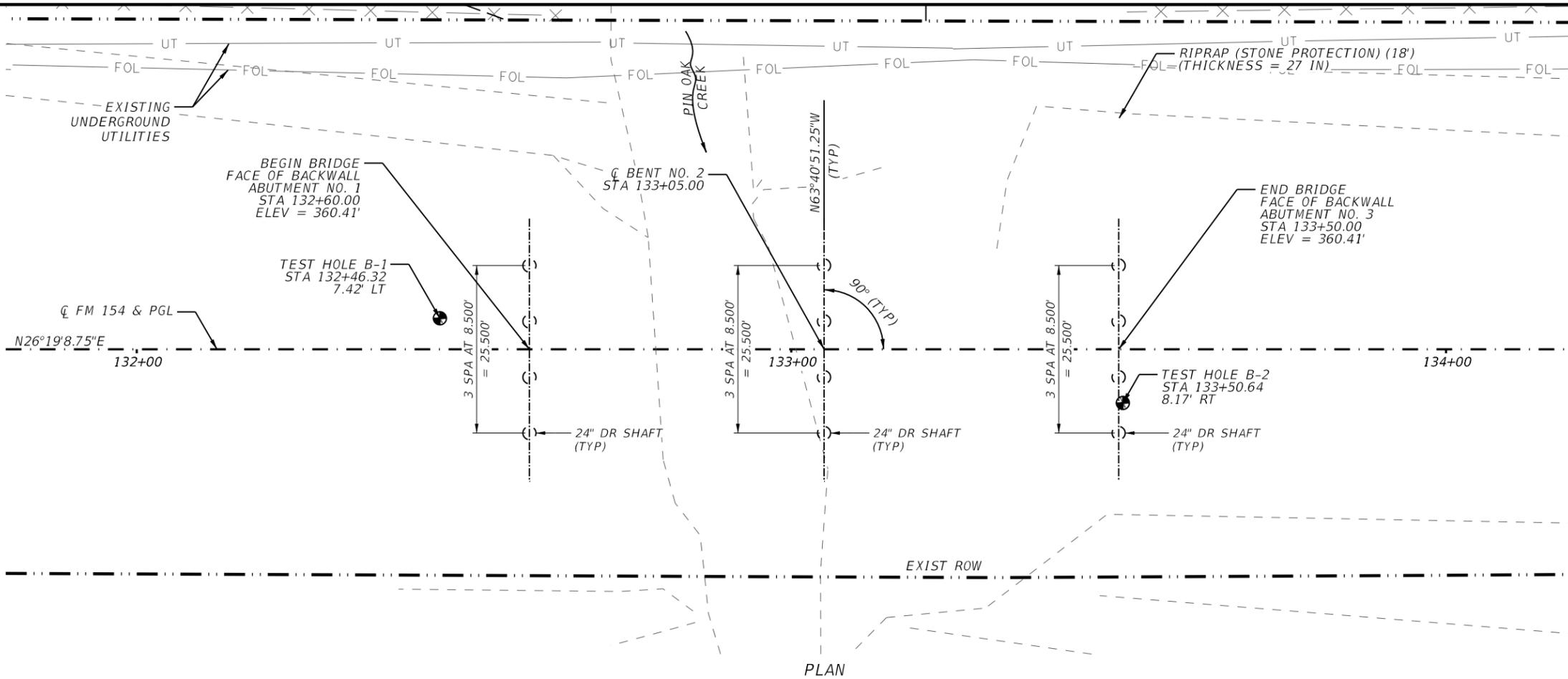


FM 154 AT PIN OAK CREEK

**BRIDGE  
ESTIMATED QUANTITIES**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO. 44		



PLAN

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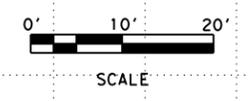
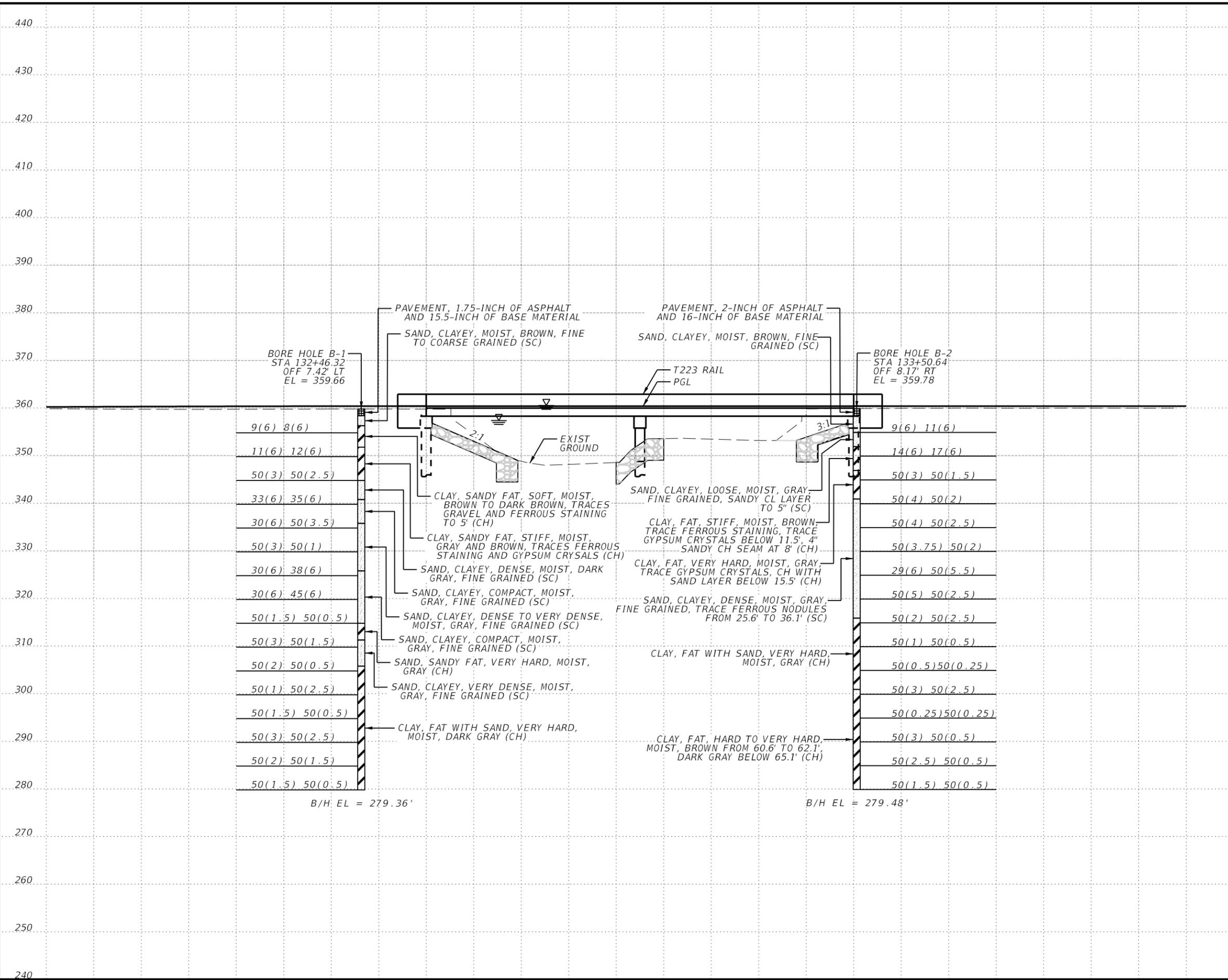
FM 154 AT PIN OAK CREEK

FOUNDATION LAYOUT

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	
TEXAS	YOAKUM	FAYETTE	
CONT.	SECT.	JOB	
0334	08	037	
			SHEET NO. 45

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03/07/2023

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**Kimley»Horn** F-928

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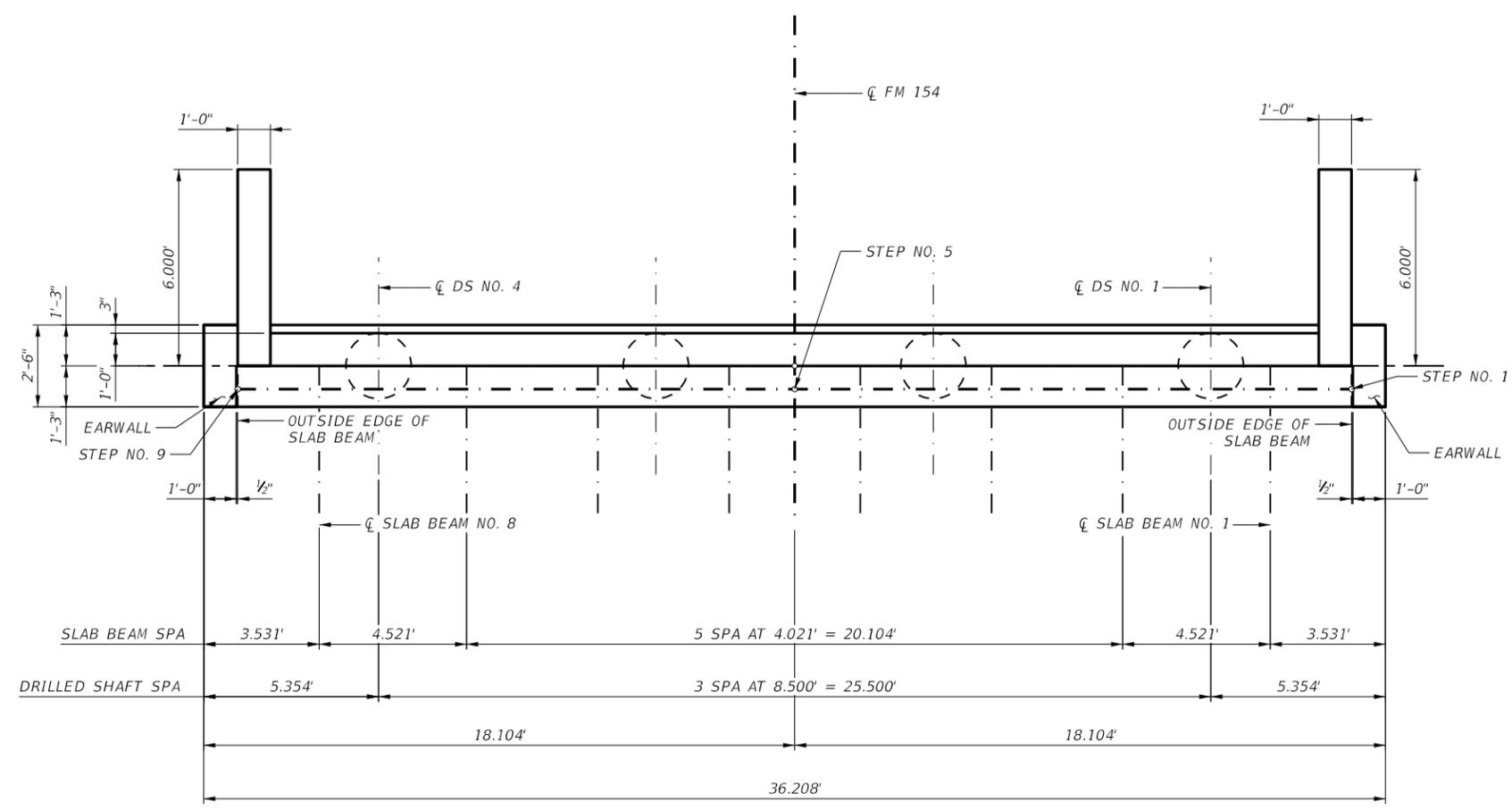
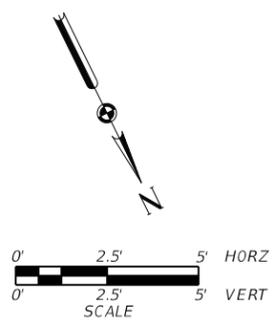
FM 154 AT PIN OAK CREEK

**BORING LOGS**

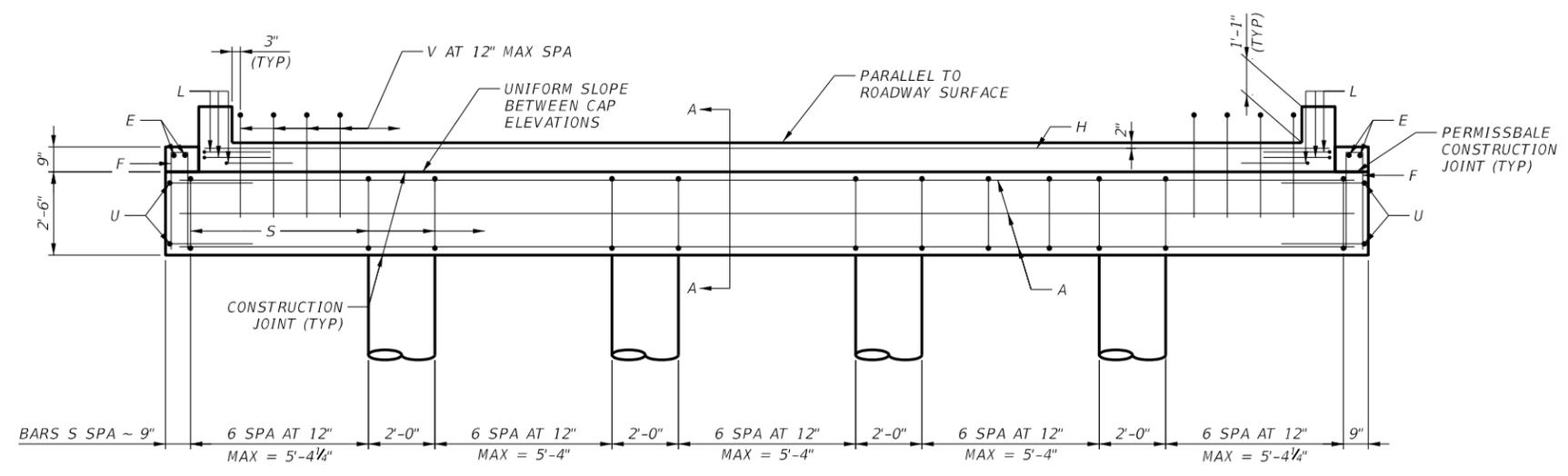
SCALE: VER 1" = 10'

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	COUNTY	SHEET NO.
TEXAS	YOAKUM FAYETTE	46
CONT.	SECT.	JOB
0334	08	037



PLAN



ELEVATION  
LOOKING BACKSTATION

**NOTES:**

- DESIGNED ACCORDING TO AASHTO BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020), AND INTERIM REVISIONS THERETO.
- SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.
- SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
- SEE STONE RIPRAP (SRR) STANDARD FOR RIPRAP ATTACHMENT DETAILS.
- SEE ABUTMENT DETAILS SHEET FOR SECTION A-A, CORNER DETAILS, WINGWALL DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.
- SEE T223 RAIL STANDARD FOR RAIL ANCHORAGE IN WINGWALL.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.  
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



*Signature*



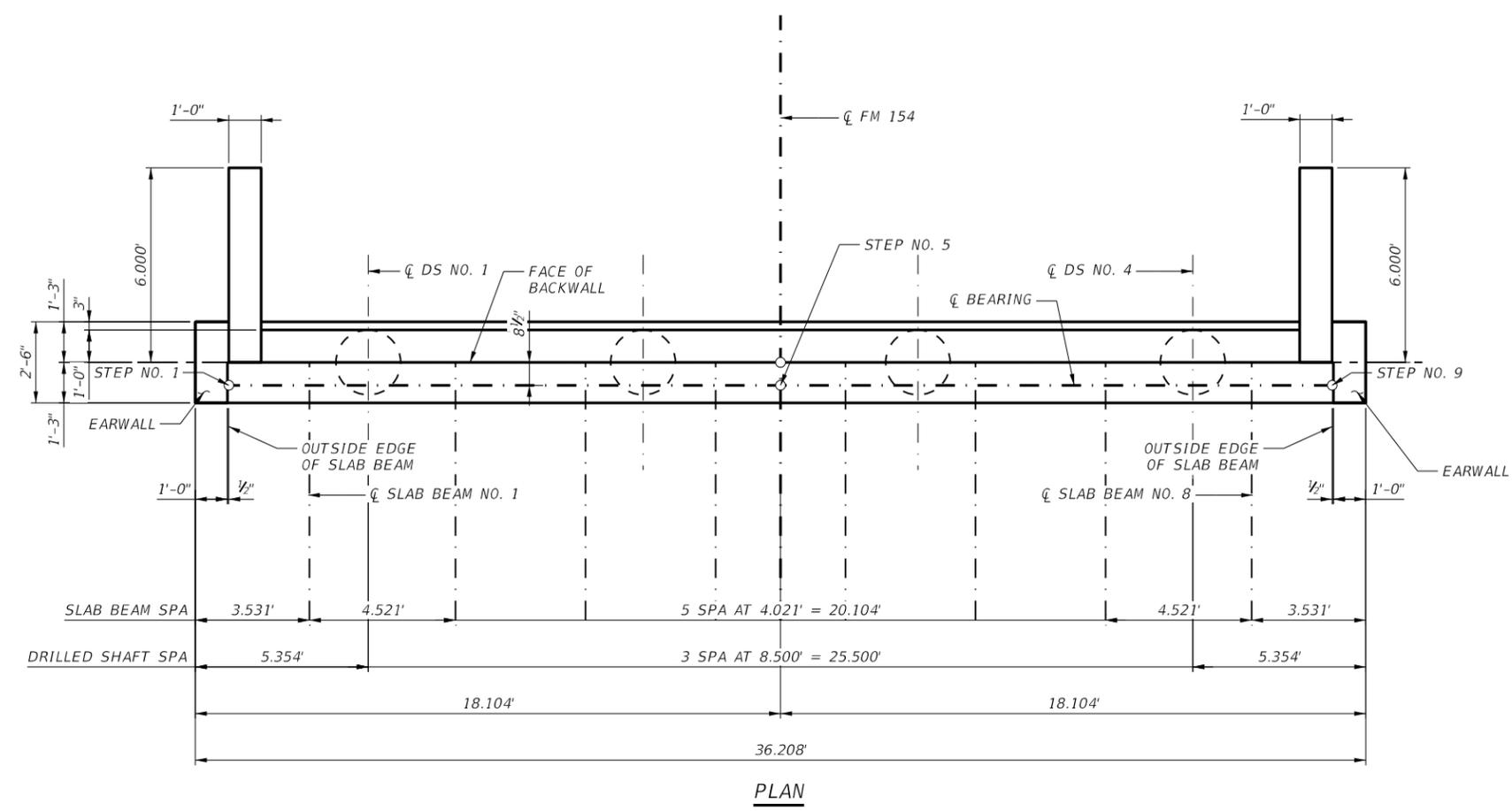
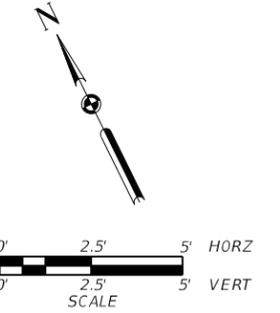
FM 154 AT PIN OAK CREEK

**ABUTMENT NO. 1**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		
47		

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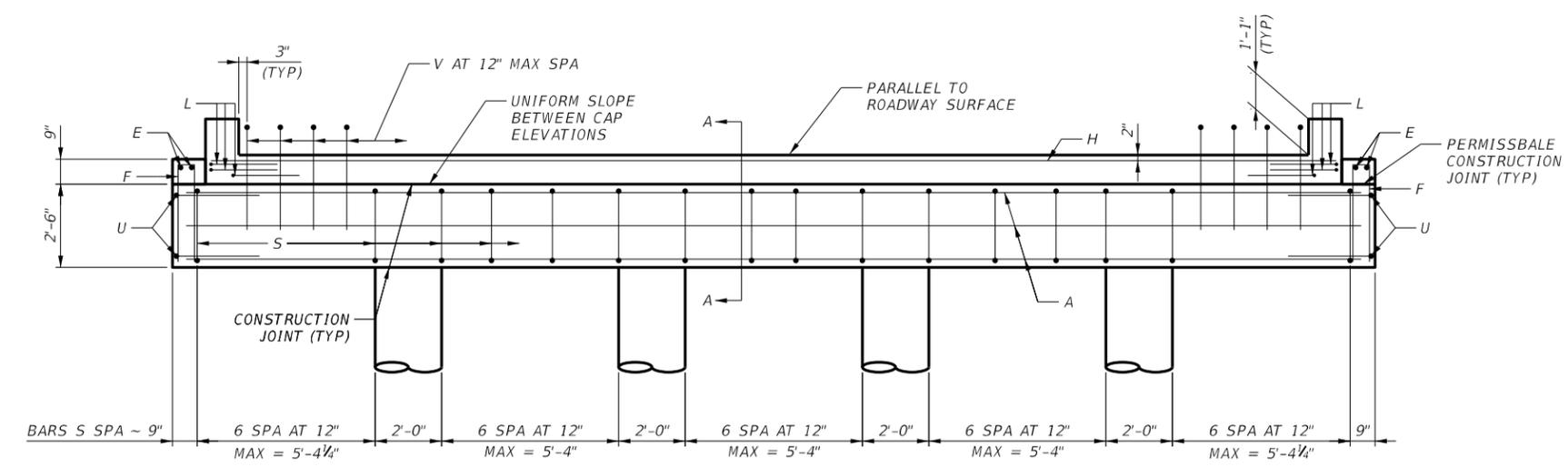


PLAN

NOTES:

1. DESIGNED ACCORDING TO AASHTO BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020), AND INTERIM REVISIONS THERETO.
2. SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE STONE RIPRAP (SRR) STANDARD FOR RIPRAP ATTACHMENT DETAILS.
5. SEE ABUTMENT DETAILS SHEET FOR SECTION A-A, CORNER DETAILS, WINGWALL DETAILS, CONTROL ELEVATIONS, AND BAR DETAILS.
6. SEE T223 RAIL STANDARD FOR RAIL ANCHORAGE IN WINGWALL.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.  
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



ELEVATION  
LOOKING UPSTATION

03/07/2023



*Ryan C. Laurent*



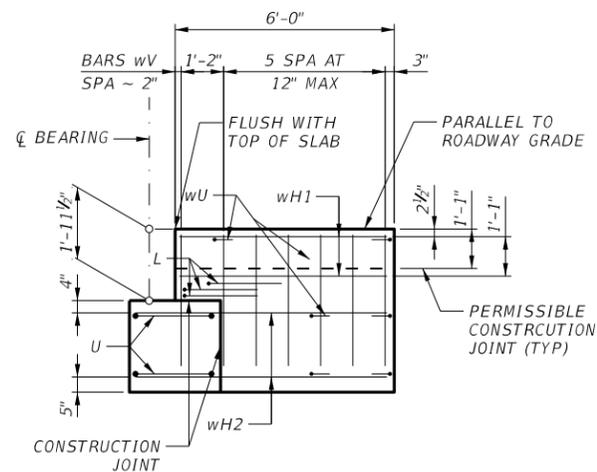
FM 154 AT PIN OAK CREEK

ABUTMENT NO. 3

SHEET 1 OF 1

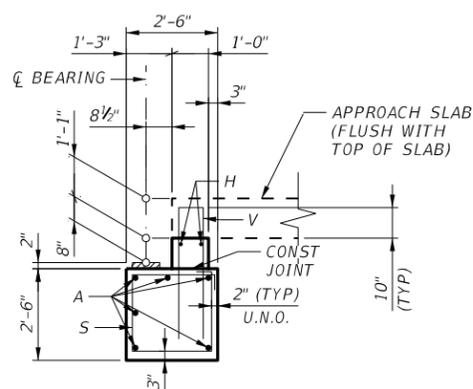
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6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		48

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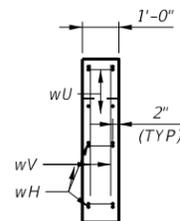


**WINGWALL ELEVATION**

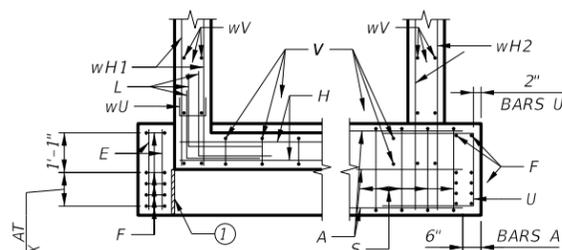
(EARWALL NOT SHOWN FOR CLARITY)



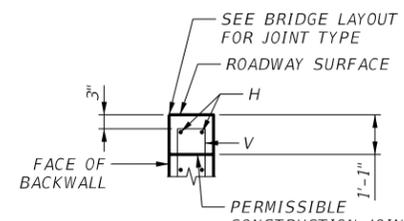
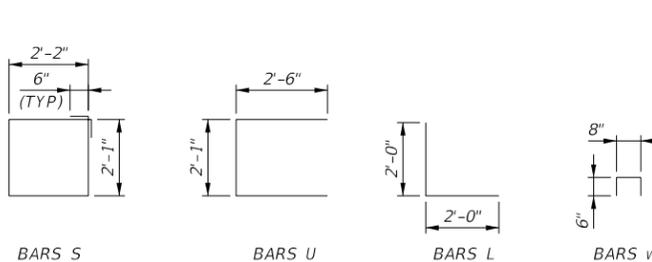
**SECTION A-A**



**SECTION B-B**

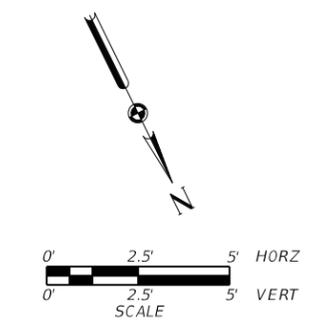


**BACKWALL CORNER DETAILS**



**BACKWALL DETAIL**

(WITHOUT APPROACH SLAB)  
NOTE: AT CONTRACTOR'S OPTION, BACKWALL MAY BE CAST IN ONE LIFT TO ROADWAY SURFACE



**NOTES:**

- ① 1/2" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN SLAB BEAM AND EARWALL. BOND TO EARWALL WITH AN APPROVED ADHESIVE. CAST INSIDE FACE OF EARWALL PERPENDICULAR TO CAP. (TYP)

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

**MATERIAL NOTES:**

PROVIDE CLASS C CONCRETE, (f'c = 3,600 PSI)

PROVIDE GRADE 60 REINFORCING STEEL.

CALCULATED FOUNDATION LOAD:  
- 69 TONS/SHAFT

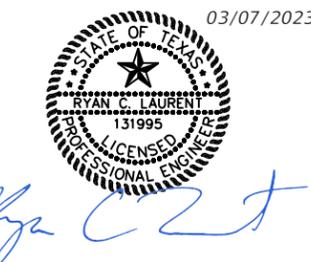
**TABLE OF ESTIMATED QUANTITIES \*\***

BAR	NO.	SIZE	LENGTH	WEIGHT
A	6	#11	35'-3"	1,124
E	4	#4	2'-2"	6
F	10	#4	6'-4"	43
H	4	#5	33'-10"	142
L	6	#6	4'-0"	36
S	34	#5	9'-6"	337
U	4	#6	7'-1"	43
V	33	#5	7'-10"	270
wH1	8	#6	5'-8"	68
wH2	8	#6	6'-11"	83
wU	12	#4	1'-8"	14
wV	28	#5	4'-1"	119
ITEM		UNIT	QUANTITY	
REINFORCING STEEL *		LB	2,285	
CL "C" CONCRETE (ABUT)		CY	12.2	

\* FOR CONTRACTOR'S INFORMATION ONLY  
\*\* QUANTITIES SHOWN ARE PER ABUTMENT

	TOP OF CAP			TOP OF DRILLED SHAFT***			
	STEP 1	STEP 5	STEP 9	DS 1	DS 2	DS 3	DS 4
ABUT 1	358.152	358.493	358.152	355.738	355.908	355.908	355.738
ABUT 3	358.152	358.493	358.152	355.738	355.908	355.908	355.738

\*\*\* ELEVATIONS AT C OF DRILLED SHAFT



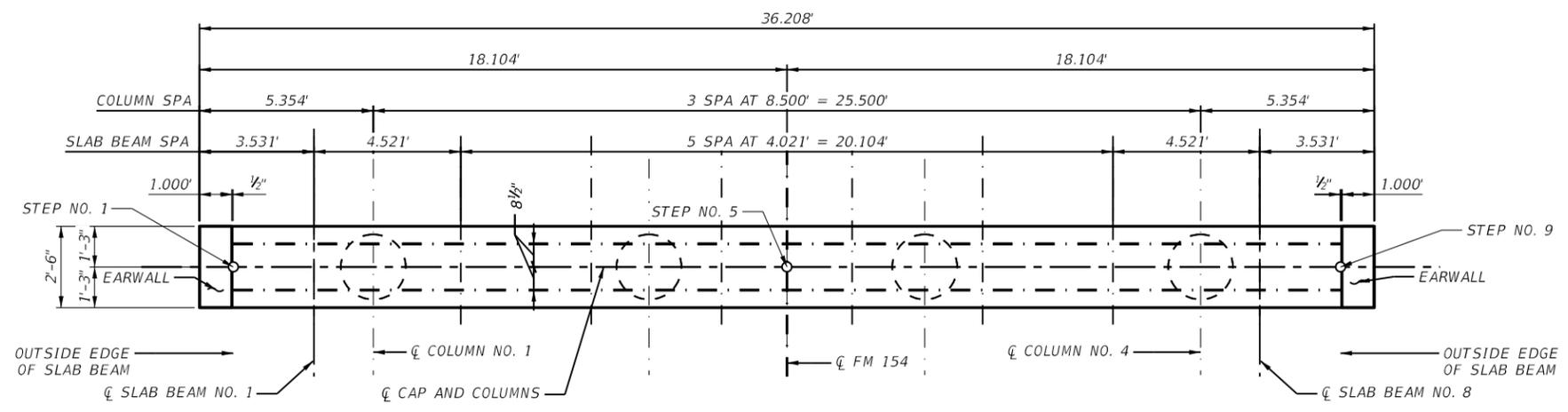
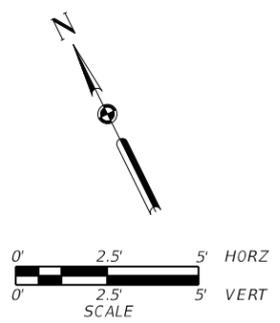
FM 154 AT PIN OAK CREEK

**ABUTMENT DETAILS**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		49

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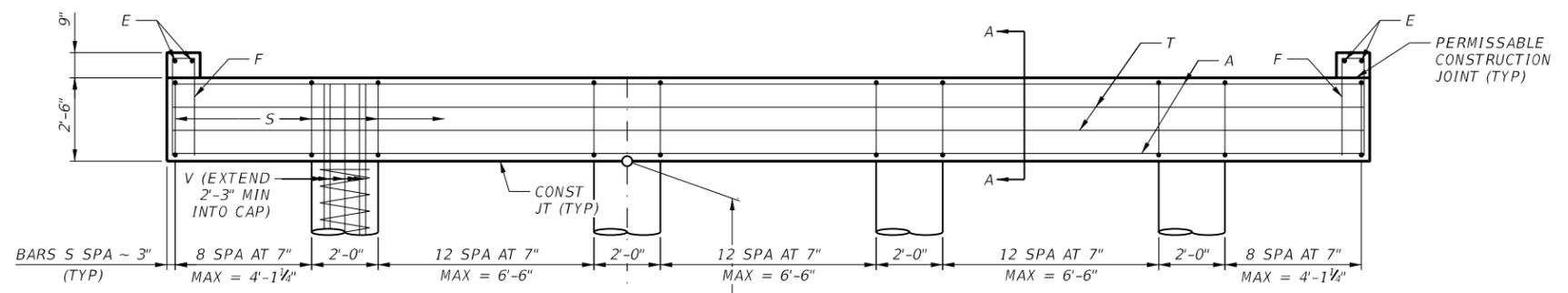


PLAN

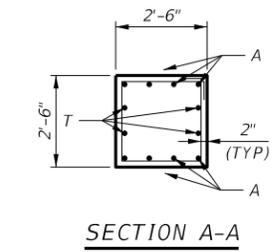
- NOTES:**
- DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND INTERIM REVISIONS THERTO.
  - SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.
  - SEE COMMON FOUNDATION DETAILS (FD) STANDARD FOR ALL FOUNDATION DETAILS AND NOTES.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.  
 REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

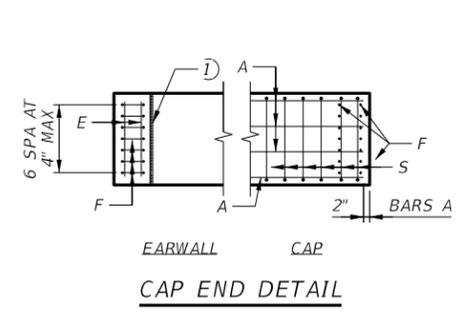
**MATERIAL NOTES**  
 PROVIDE CLASS C CONCRETE ( $f'_c = 3,600$  PSI).  
 PROVIDE GRADE 60 REINFORCING STEEL  
 CALCULATED FOUNDATION LOAD:  
 - 114 TONS/SHAFT



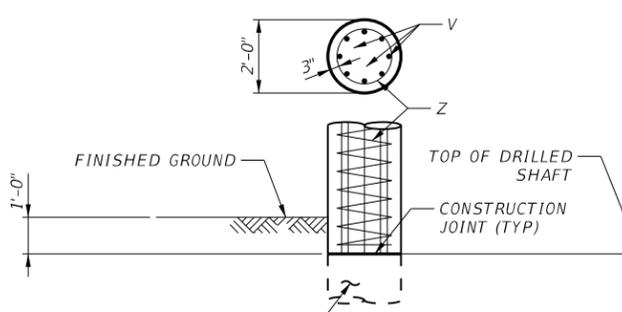
ELEVATION  
 LOOKING UPSTAIR



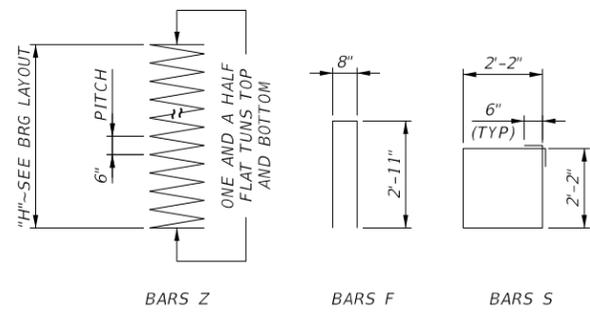
SECTION A-A



EARWALL CAP  
 CAP END DETAIL



SEE BRIDGE LAYOUT FOR FOUNDATION TYPE. SEE FD SHEET FOR DETAILS



BARS Z BARS F BARS S



**Kimley»Horn** F-928

Texas Department of Transportation  
 FM 154 AT PIN OAK CREEK

BENT NO. 2

TABLE OF ESTIMATED QUANTITIES				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	8	#11	35'-10"	1,524
E	4	#4	2'-2"	6
F	14	#4	6'-6"	63
S	57	#5	9'-8"	575
T	4	#5	35'-10"	150
ITEM	UNIT	QUANTITY		
REINFORCING STEEL *	LB	2,318		
CL "C" CONCRETE (CAP)	CY	11.3		

\* FOR CONTRACTOR'S INFORMATION ONLY

CONTROL ELEVATIONS							
	TOP OF CAP			TOP OF COLUMN **			
	STEP 1	STEP 5	STEP 9	COL 1	COL 2	COL 3	COL 4
BENT 2	358.152	358.493	358.152	355.738	355.908	355.908	355.738

\*\* ELEVATIONS AT  $\phi$  OF COLUMN

TABLE OF ESTIMATED QUANTITIES											
TABLE OF VARIABLE BENT COLUMN QUANTITIES											
	COL	"H"	BARS V #7			BARS Z #3			REINF *	CL "C" CONC (COLUMN)	
			NO.	LENGTH	WEIGHT	NO.	LENGTH	WEIGHT			LB
BENT 2	1-4	8	32	10'-3"	671	4	90'-2"	136	807	3.8	
									TOTAL	807	3.8

\* FOR CONTRACTOR'S INFORMATION ONLY

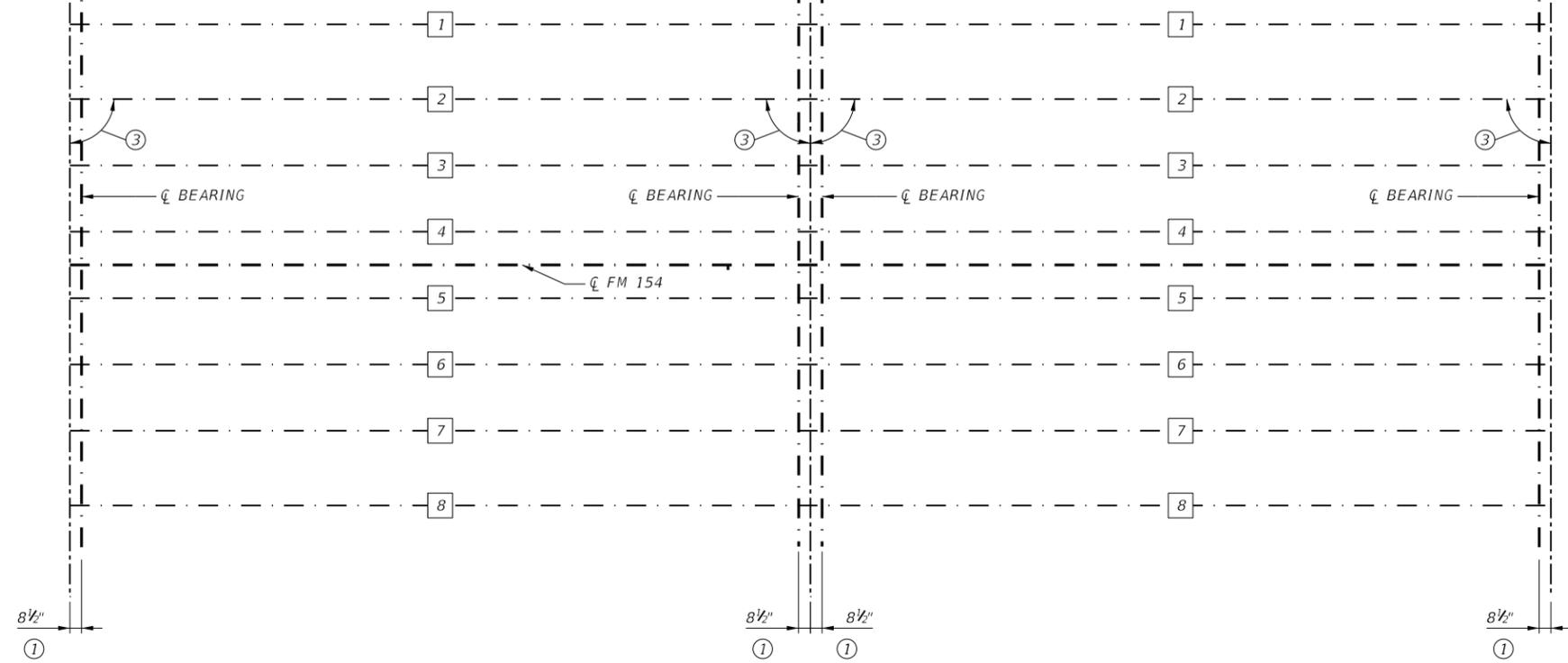
SHEET 1 OF 1			
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	
TEXAS	YOAKUM	FAYETTE	
CONT.	SECT.	JOB	
0334	08	037	
			SHEET NO. 50

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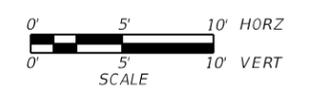
FACE OF BACKWALL  
ABUTMENT NO. 1

CL BENT NO. 2

FACE OF BACKWALL  
ABUTMENT NO. 3



FRAMING PLAN - UNIT 1



NOTES:

- ① SEE PSBEB STANDARD FOR ELASTOMETRIC BEARING AND BEAM END DETAILS.
- ② BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.
- ③ GIRDER ANGLE (TYP)

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*Ryan C. Laurent*

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

FRAMING PLAN

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.	
6		FM 154	
STATE	DIST.	COUNTY	
TEXAS	YOAKUM	FAYETTE	
CONT.	SECT.	JOB	
0334	08	037	
			SHEET NO. 51

BEAM REPORT AT CENTER OF BOX, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	TRUE DISTANCE C-C BRG.	BEAM BOT. BM. FLG.	BEAM SLOPE	BEAM BEARING
BOX 1	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 2	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 3	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 4	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 5	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 6	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 7	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 8	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E

BENT REPORT

BENT NO. 1 (S 63 40 52.02 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.0626 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S	DIST CL BENT TO PERP TO CL BENT	DIST CL BENT TO ALONG CL BEAM	DIST CL BENT TO PERP TO CL BENT	DIST CL BENT TO ALONG CL BEAM
SPAN 1						
STEP 1	0.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 1						
LEFT						
CENTER						
RIGHT						
STEP 2	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 2						
LEFT						
CENTER						
RIGHT						
STEP 3	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 3						
LEFT						
CENTER						
RIGHT						
STEP 4	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 4						
LEFT						
CENTER						
RIGHT						
STEP 5	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 5						
LEFT						
CENTER						
RIGHT						
STEP 6	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 6						
LEFT						
CENTER						
RIGHT						
STEP 7	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 7						
LEFT						
CENTER						
RIGHT						
STEP 8	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 8						
LEFT						
CENTER						
RIGHT						
STEP 9	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
TOTAL	34.1253					

BENT REPORT

BENT NO. 2 (S 63 40 52.02 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.0626 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S	DIST CL BENT TO PERP TO CL BENT	DIST CL BENT TO ALONG CL BEAM	DIST CL BENT TO PERP TO CL BENT	DIST CL BENT TO ALONG CL BEAM
SPAN 1						
STEP 1	0.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 1						
LEFT						
CENTER						
RIGHT						
STEP 2	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 2						
LEFT						
CENTER						
RIGHT						
STEP 3	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 3						
LEFT						
CENTER						
RIGHT						
STEP 4	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 4						
LEFT						
CENTER						
RIGHT						
STEP 5	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 5						
LEFT						
CENTER						
RIGHT						
STEP 6	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 6						
LEFT						
CENTER						
RIGHT						
STEP 7	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 7						
LEFT						
CENTER						
RIGHT						
STEP 8	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
BOX 8						
LEFT						
CENTER						
RIGHT						
STEP 9	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
TOTAL	34.1253					

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**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

FRAMING PLAN

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO. 52		

BEAM REPORT AT CENTER OF BOX, SPAN 2

	HORIZONTAL DISTANCE		TRUE DISTANCE	BEAM	BEAM BEARING
	C-C BENT	C-C BRG.	BOT. BM. FLG.	SLOPE	
BOX 1	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 2	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 3	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 4	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 5	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 6	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 7	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E
BOX 8	45.0000	43.5833	44.5000	0.00000	N 26 19 7.98 E

BENT REPORT

BENT NO. 2 (S 63 40 52.02 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.0626 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S	DIST CL BENT TO CL BRNG		DIST CL BENT TO END OF BM	
			PERP TO CL BENT	ALONG CL BEAM	PERP TO CL BENT	ALONG CL BEAM
SPAN 2						
STEP 1	0.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 1 CENTER						
RIGHT						
STEP 2	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 2 CENTER						
RIGHT						
STEP 3	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 3 CENTER						
RIGHT						
STEP 4	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 4 CENTER						
RIGHT						
STEP 5	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 5 CENTER						
RIGHT						
STEP 6	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 6 CENTER						
RIGHT						
STEP 7	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 7 CENTER						
RIGHT						
STEP 8	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 8 CENTER						
RIGHT						
STEP 9	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
TOTAL	34.1253					

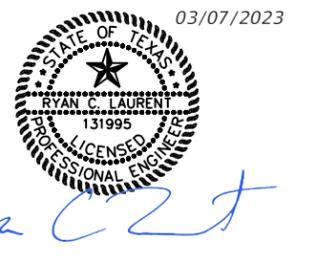
BENT REPORT

BENT NO. 3 (S 63 40 52.02 E)

DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 17.0626 L

BOX	STEP SPAC. (CL BENT)	BEAM ANGLE D M S	DIST CL BENT TO CL BRNG		DIST CL BENT TO END OF BM	
			PERP TO CL BENT	ALONG CL BEAM	PERP TO CL BENT	ALONG CL BEAM
SPAN 2						
STEP 1	0.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 1 CENTER						
RIGHT						
STEP 2	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 2 CENTER						
RIGHT						
STEP 3	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 3 CENTER						
RIGHT						
STEP 4	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 4 CENTER						
RIGHT						
STEP 5	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 5 CENTER						
RIGHT						
STEP 6	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 6 CENTER						
RIGHT						
STEP 7	4.0208	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 7 CENTER						
RIGHT						
STEP 8	4.0209	90 0 0.00	0.7083	0.7083	0.2500	0.2500
LEFT						
BOX 8 CENTER						
RIGHT						
STEP 9	5.0000	90 0 0.00	0.7083	0.7083	0.2500	0.2500
TOTAL	34.1253					

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**Kimley»Horn** F-928

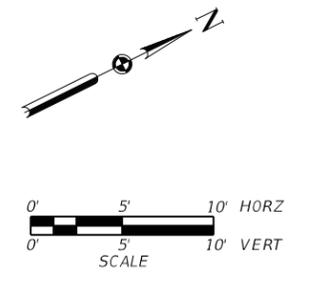
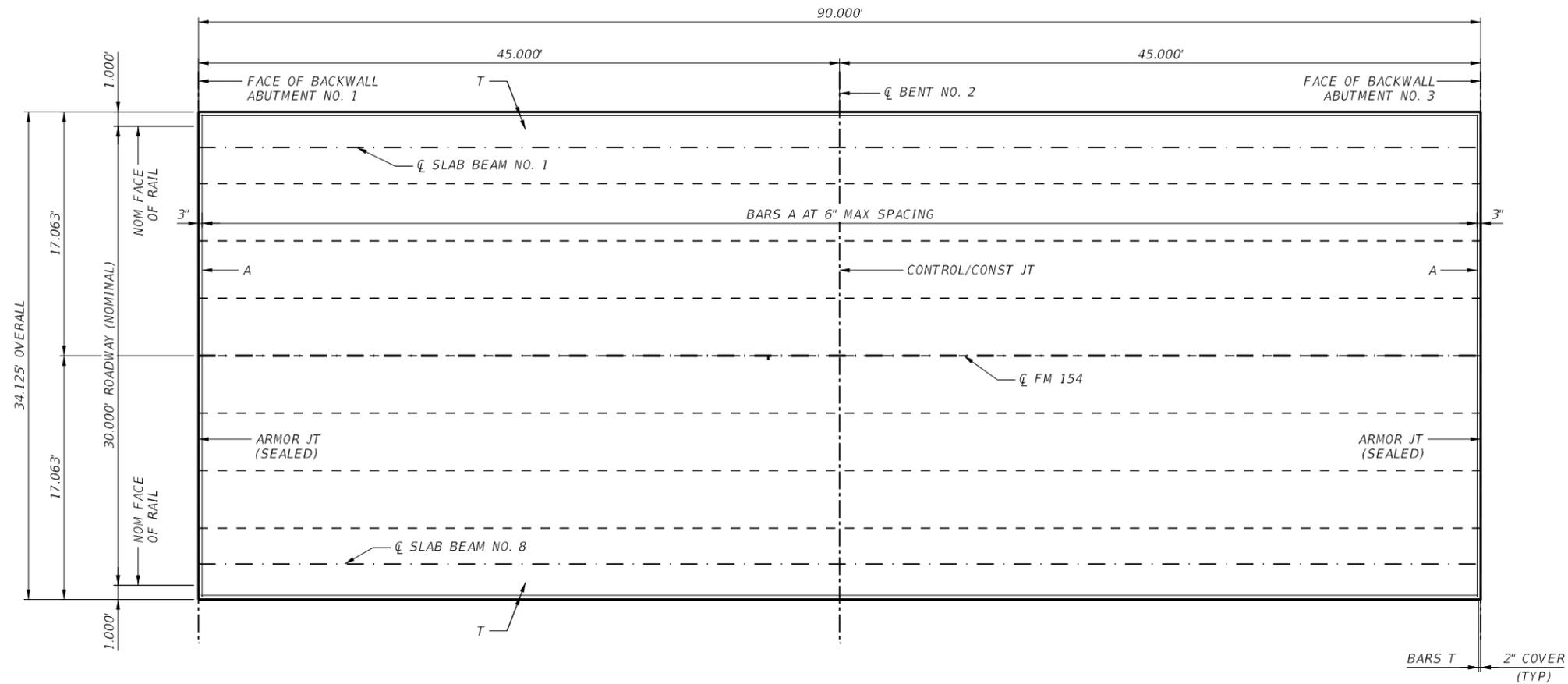


FM 154 AT PIN OAK CREEK

FRAMING PLAN

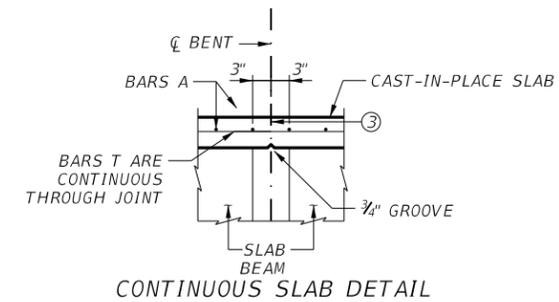
SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
SHEET NO.		
53		



- NOTES:**
- DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9TH EDITION (2020) AND CURRENT INTERIMS.
  - SEE T223 STANDARD FOR RAIL ANCHORAGE IN SLAB.
  - 1 1/2" VINYL OR PLASTIC JOINT FORMER (STRESS CAP, ZIP STRIP, STRESS LOCK, OR EQUAL AS APPROVED BY THE ENGINEER.)
  - SEE BRIDGE LAYOUT FOR BEAM TYPE.

**SLAB DETAILS - UNIT 1**



**CONTINUOUS SLAB DETAIL**

**TABLE OF VARIABLE VALUES**

SPAN	SPAN LENGTHS	BEAM TYPE	DEAD LOAD DEFLECTION		SECTION DEPTHS	
			"A"	"B"	"X"	"Y"
	FT	(4)	FT	FT	IN	FT/IN
1 - 2	45	4SB15	0.018	0.025	6"	1'-9"
		5SB15	0.018	0.025		

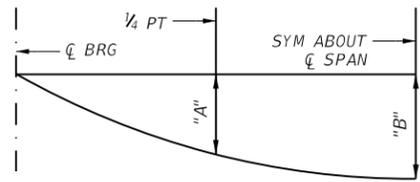
**BAR TABLE**

BAR	SIZE
A	#5
T	#4

**TABLE OF ESTIMATED QUANTITIES**

SPAN	SPAN LENGTH	REINF CONCRETE SLAB	PRESTRESSED CONCRETE SLAB BEAMS (4SB15)	PRESTRESSED CONCRETE SLAB BEAMS (5SB15)	TOTAL REINF STEEL *
		SF	LF	LF	LB
1	45	1,540	267.00	89.00	4,312
2	45	1,540	267.00	89.00	4,312
TOTAL	90	3,080	534.00	178.00	8,624

\* REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.8 LBS/SF.



**DEAD LOAD DEFLECTION DIAGRAM**

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE CONCRETE SLAB ONLY (E<sub>c</sub> = 5000 KSI).  
 CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY VARY.  
 ADJUST BASED ON FIELD VERIFICATION.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

- MATERIAL NOTES:**
- PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI)
  - PROVIDE GRADE 60 REINFORCING STEEL
  - PROVIDE BAR LAPS, WHERE REQUIRED AS FOLLOWS:  
 UNCOATED ~ #4 = 1'-7"  
 ~ #5 = 2'-0"

DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A1064) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUTED FOR BARS A OR T UNLESS NOTED OTHERWISE.

03/07/2023

*Ryan C. Laurent*

**Kimley»Horn** F-928

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**Texas Department of Transportation**

FM 154 AT PIN OAK CREEK

**SLAB DETAILS**

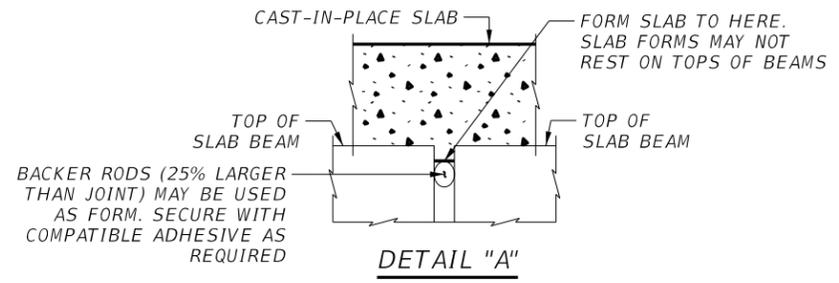
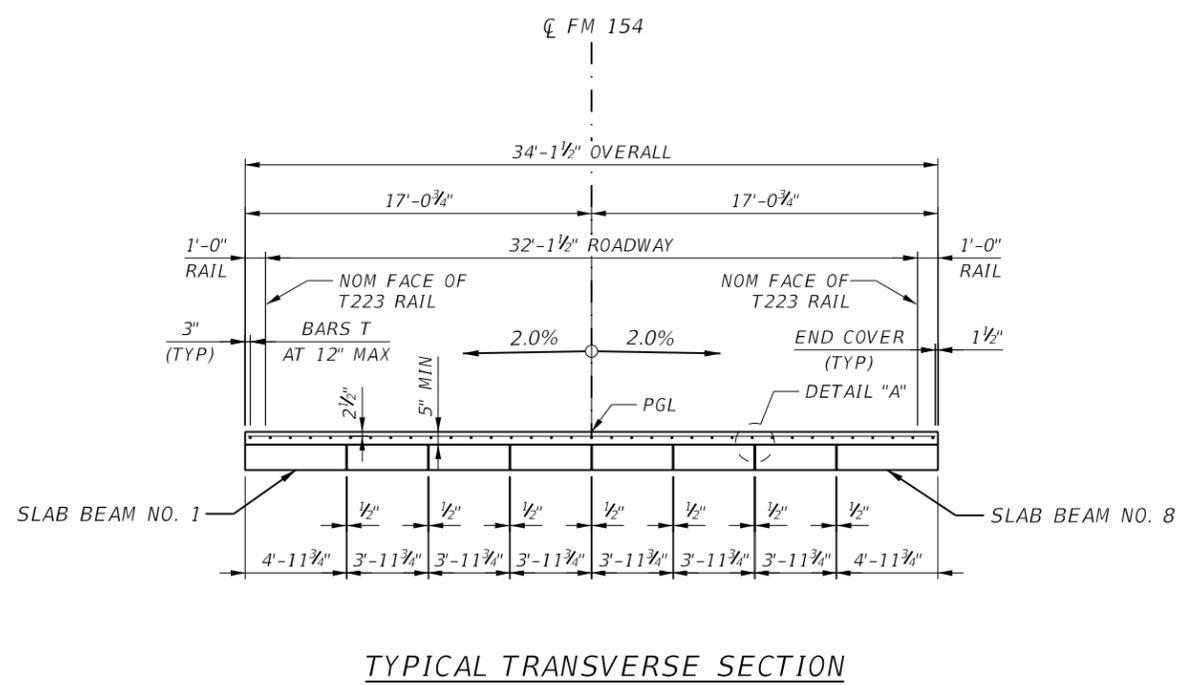
SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037

SHEET NO. 54

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**Kimley»Horn** F-928



**BRIDGE**  
**TYPICAL TRANSVERSE**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO. 55

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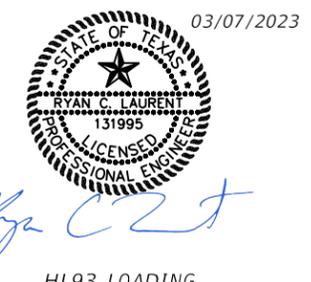
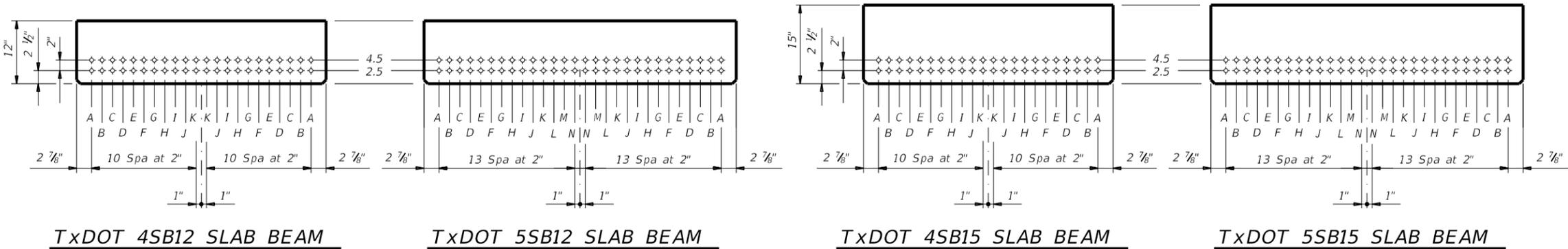
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)																	OPTIONAL DESIGN					LOAD RATING FACTORS			NON-STANDARD STRAND PATTERNS							
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRANDS PER ROW							CONCRETE		DESIGN LOAD COMP STRESS (TOP $\bar{\epsilon}$ ) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT $\bar{\epsilon}$ ) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I			SERVICE III			PATTERN	STRAND ARRANGEMENT AT $\bar{\epsilon}$ OF BEAM	
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" $\bar{\epsilon}$ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRGTH $\bar{\epsilon}$ (ksi)				MINIMUM 28 DAY COMP STRGTH $\bar{\epsilon}$ (ksi)	LIVE LOAD DISTRIBUTION FACTOR		STRENGTH I			SERVICE III				
												TOTAL	DE-BONDED	3	6	9	12	15						Moment	Shear	Inv	Opr	Inv	Inv	Opr			Inv
FM 154 AT PIN OAK CREEK	1 & 2	1 & 8	5SB15		16	0.6	270	5.00	5.00	0	0.00	0	0	0	0	0	0	5.000	6.000	2.153	-2.482	968	0.383	0.383	1.32	1.72	1.06						
	1 & 2	2-7	4SB15		16	0.6	270	5.00	5.00	0	0.00	0	0	0	0	0	5.000	6.000	2.252	-2.645	862	0.363	0.363	1.24	1.61	1.06							

- ① Based on the following allowable stresses (ksi):  
 Compression = 0.65 f'ci  
 Tension = 0.24  $\sqrt{f'ci}$   
 Optional designs must likewise conform.
- ② Portion of full HL93.

**DESIGN NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.  
 Prestress losses for the designed beams have been calculated for a relative humidity of \_\_ percent. Optional designs must likewise conform.

**FABRICATION NOTES:**  
 Provide Class H concrete.  
 Provide Grade 60 reinforcing steel.  
 Use low relaxation strands, each pretensioned to 75 percent of fpu.  
 Full-length debonded strands are not permitted in positions "A" and "B".  
 Strand debonding must comply with Item 424.4.2.2.4.  
 When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.  
 Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:  
 1) Locate a strand in each "A" position.  
 2) Place strand symmetrically about vertical centerline of beam.  
 3) Space strands as equally as possible across the entire width.  
 Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.

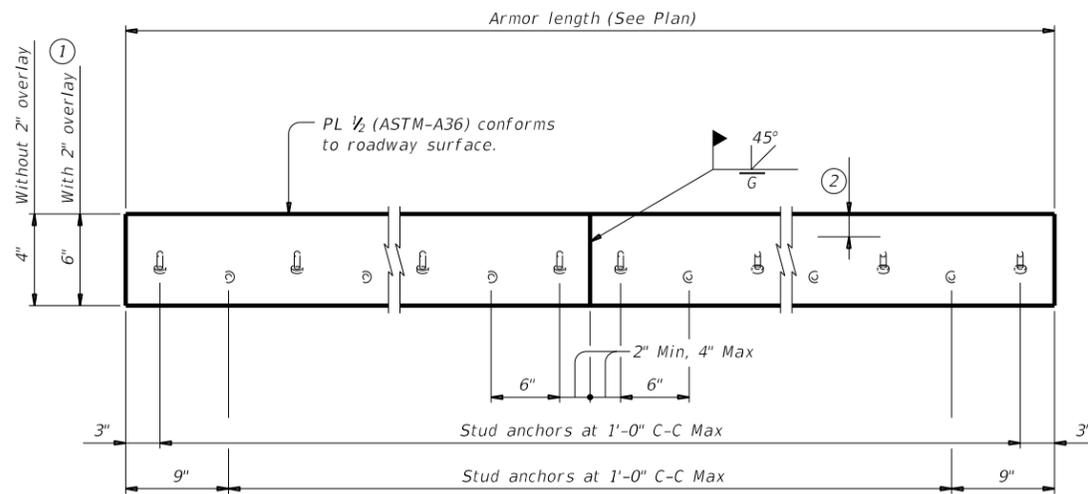
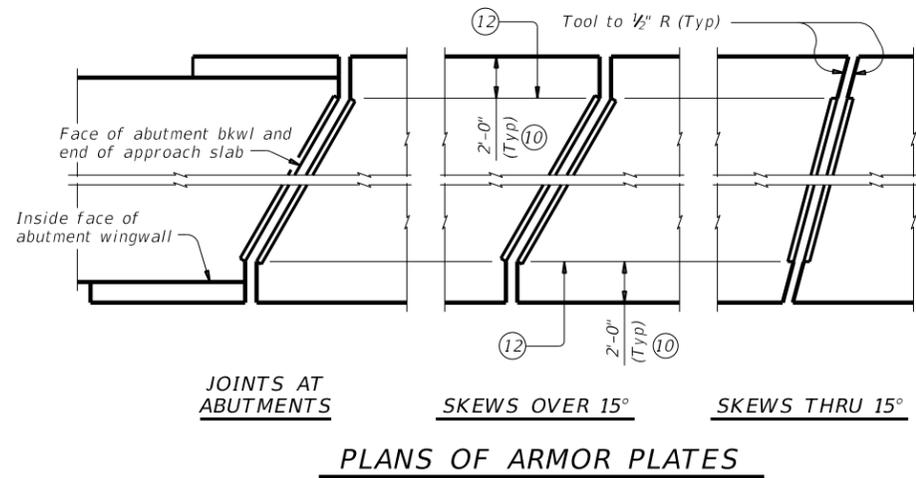


HL93 LOADING

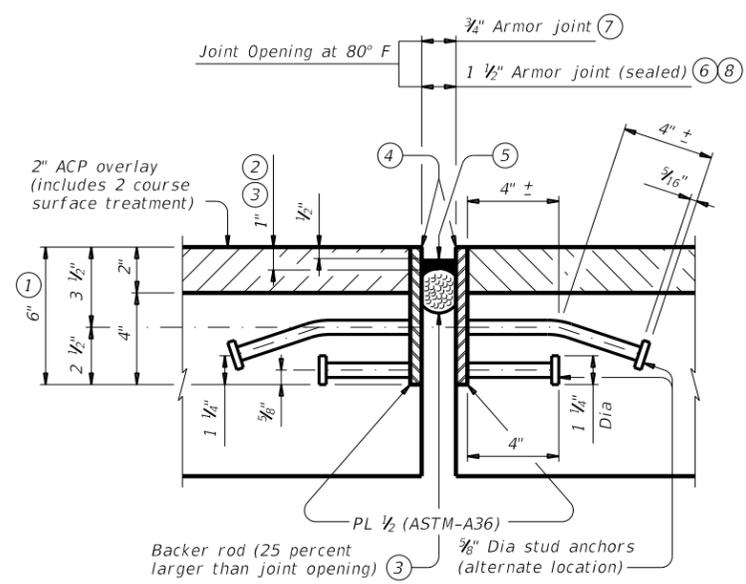
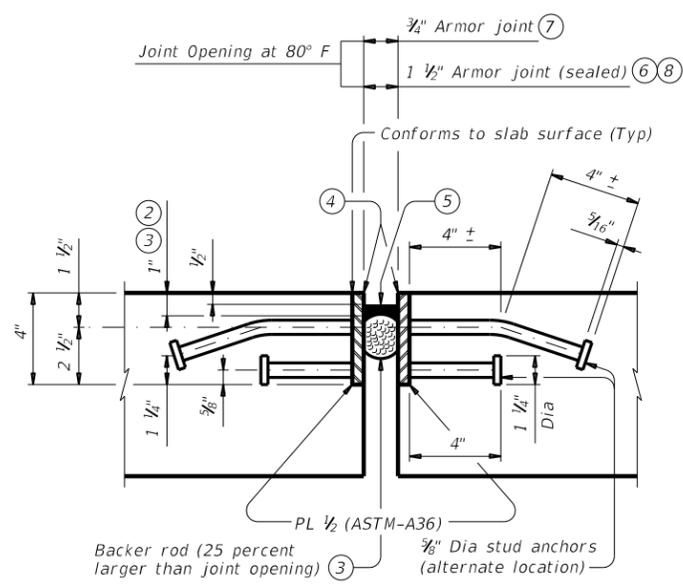
		Bridge Division Standard	
<b>PRESTRESSED CONCRETE SLAB BEAM DESIGNS (NON-STANDARD SPANS)</b>			
<b>PSBND</b>			
FILE: psbst05-22.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT January 2017	CONT	SECT	JOB
REVISIONS	0334	08	037
3-22: Added Load Rating.	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	56

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DATE: 3/6/2023 4:23:13 PM  
 FILE: c:\pwworking\kha\vw\prod\_new user (1)\d0240571\aj\std01-19.dgn



- ① Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each 1/2" variation in thickness.
- ② Do not paint top 1/2" of plate if using sealed armor joint.
- ③ Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
- ④ Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
- ⑤ Use Class 7 joint sealant that conforms to DMS-6310.
- ⑥ Place sealant while ambient temperature is between 55°F and 80°F and is rising.
- ⑦ Armor joint does not include joint sealant or backer rod.
- ⑧ Armor joint (sealed) includes Class 7 joint sealant and backer rod.
- ⑨ Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
- ⑩ Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
- ⑪ See "Plans of Armor Plates".
- ⑫ At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
- ⑬ Align shipping angle perpendicular to joint.

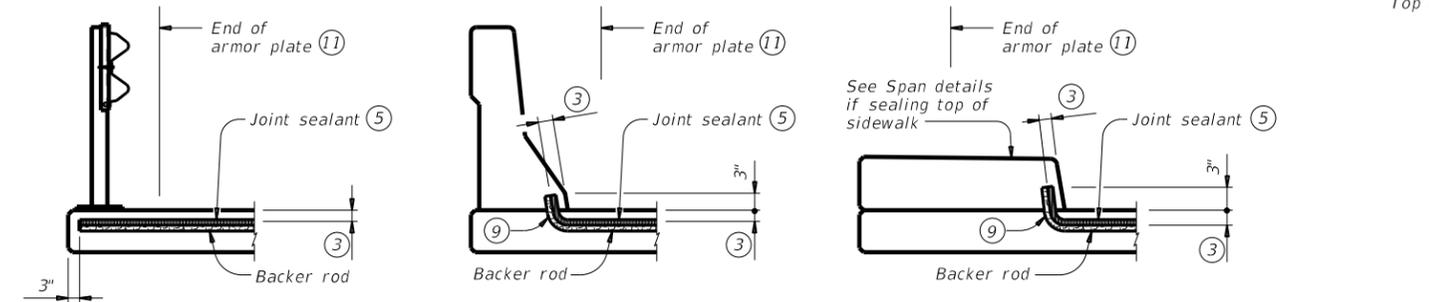


**FABRICATION NOTES:**  
 Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts. Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max. Weld studs in accordance with AWS D1.1. Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop. Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4. Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

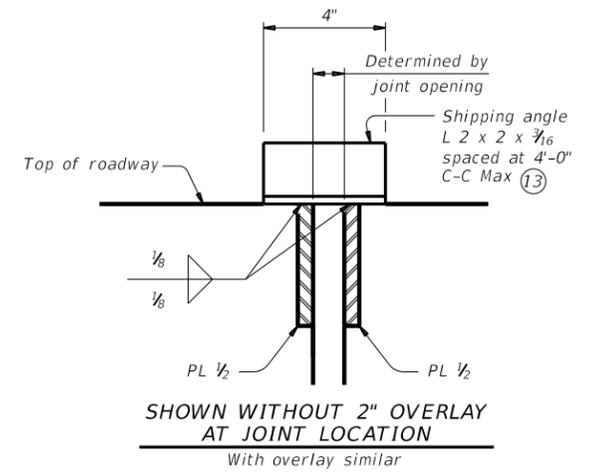
**CONSTRUCTION NOTES:**  
 Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint. Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

**GENERAL NOTES:**  
 Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans. These joint details accommodate a joint movement range of 1 3/8" ( 3/4" opening movement and 5/8" closure movement). Payment for armor joint, with or without seal, is based on length of armor plate.

**ARMOR JOINT SECTIONS**  
 Showing Armor Joint (Sealed)



**JOINT SEALANT TERMINATION DETAILS**  
 Armor joint (sealed) only. Armor plate is not shown for clarity.



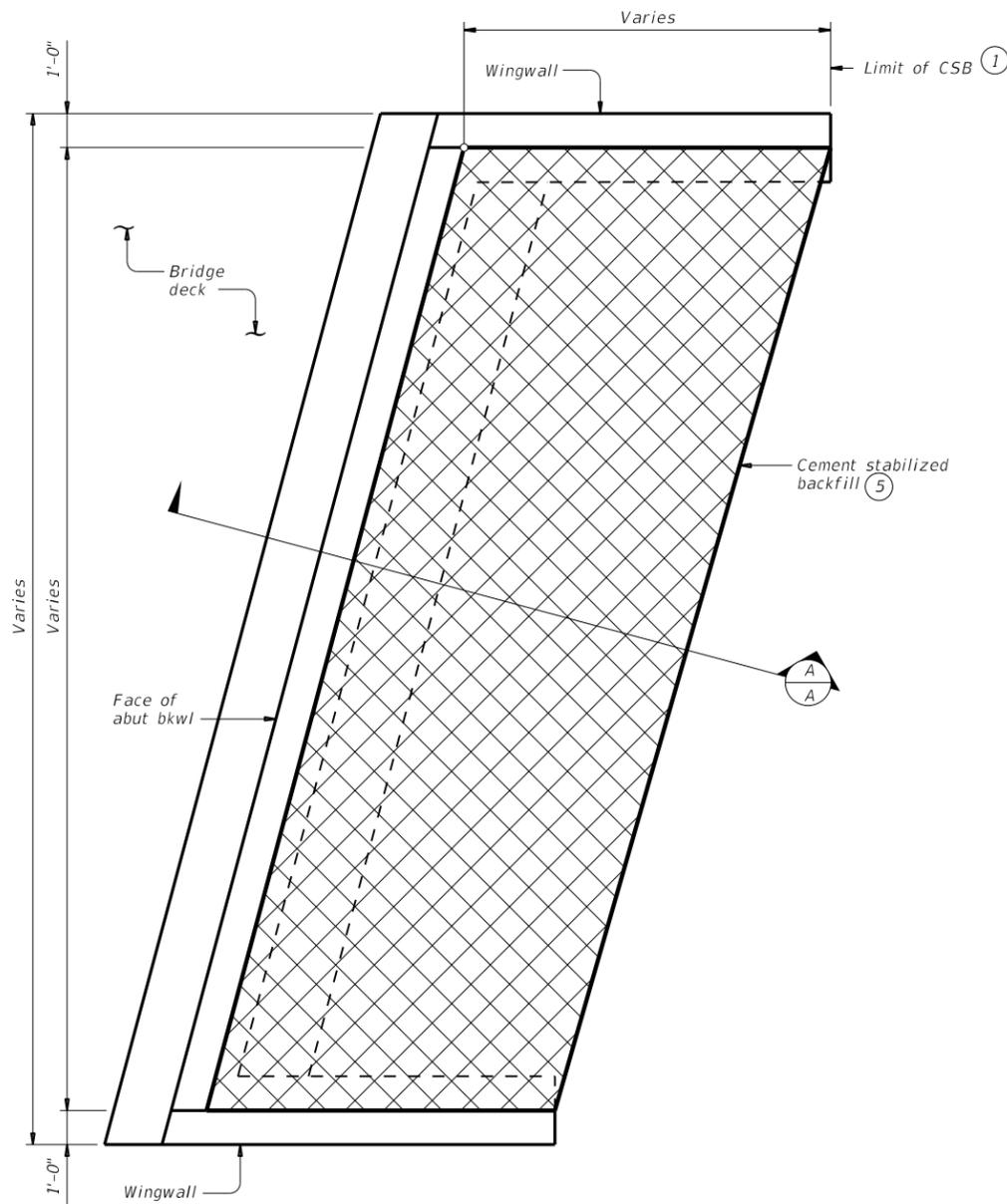
**SHIPPING ANGLE**  
 An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY ①	22.90 plf

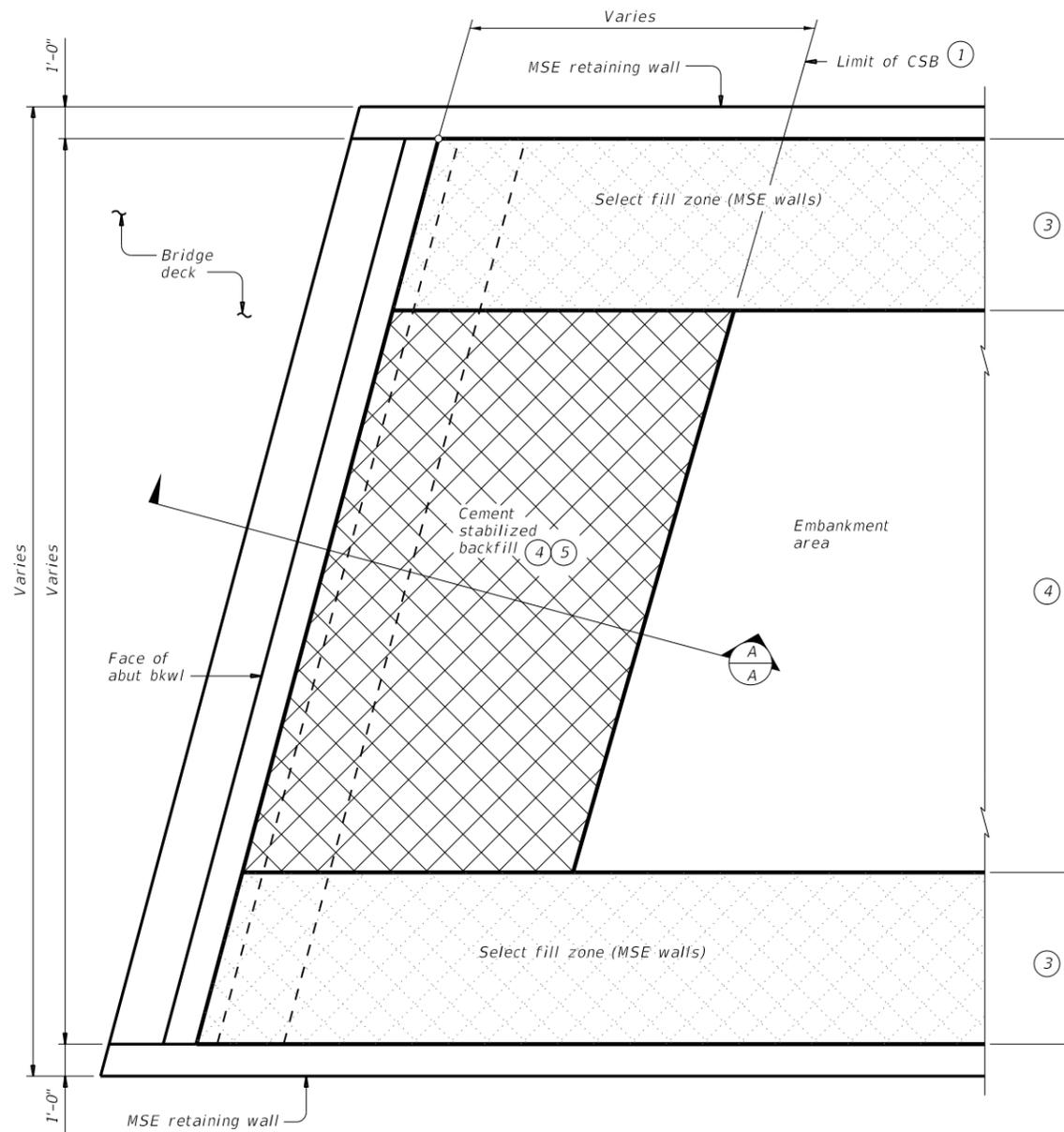
				<b>Bridge Division Standard</b>	
<h2>ARMOR JOINT DETAILS</h2>					
<b>AJ</b>					
FILE: ajstd01-19.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT	
©TxDOT April 2019 REVISIONS	CONT 0334	SECT 08	JOB 037	HIGHWAY FM 154	
	DIST YKM	COUNTY FAYETTE	SHEET NO. 57		

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DATE: 3/16/2023 4:23:16 PM  
 FILE: c:\pwworking\kno\pwworking\new\_user (1)\d0240571\csabste1-20.dgn



**OPTION 1 ~ PLAN WITH WINGWALLS**  
 Cast-in-place retaining walls similar.

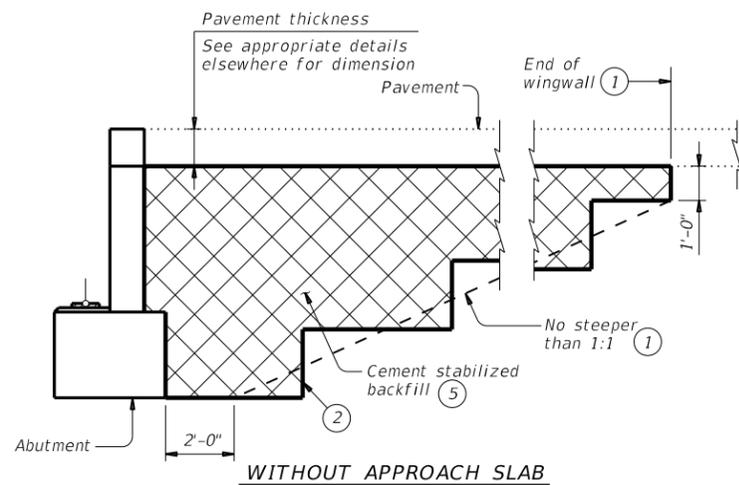


**OPTION 1 ~ PLAN WITH MSE RETAINING WALLS**

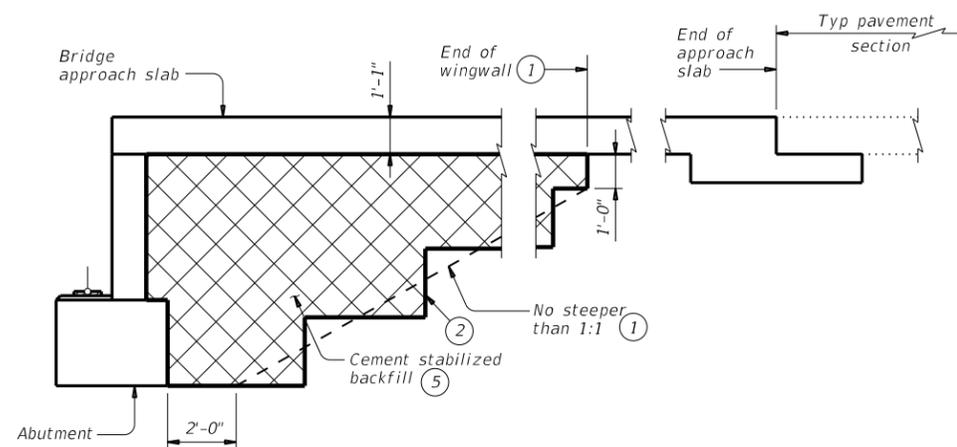
- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a) If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
  - b) Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

**GENERAL NOTES:**

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment. Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments. If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments. Details are drawn showing left forward skew. See Bridge Layout for actual skew direction. These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.



**WITHOUT APPROACH SLAB**



**SECTION A-A**

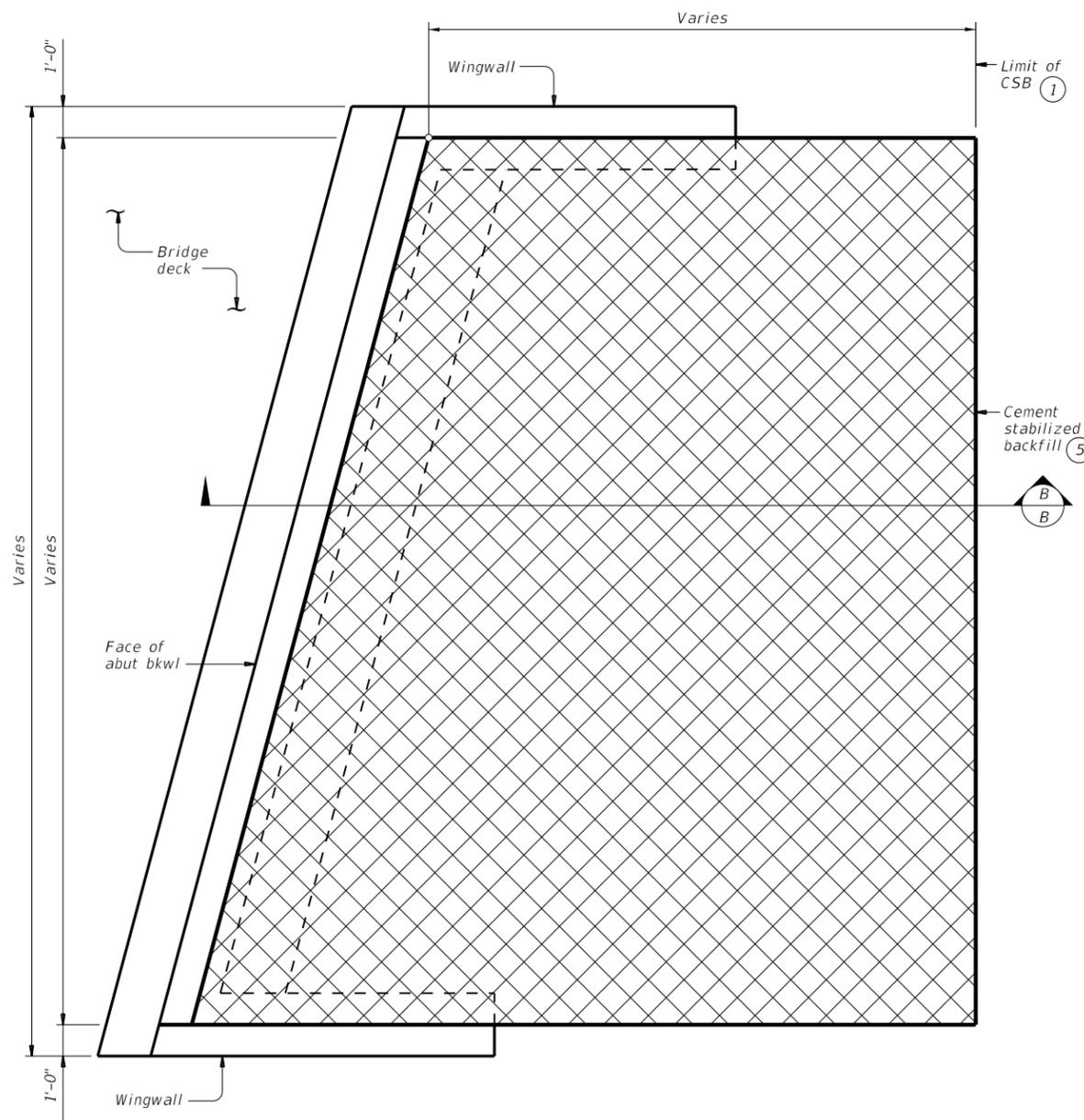
**WITH APPROACH SLAB**  
 (Showing BAS-C, BAS-A similar.)

SHEET 1 OF 2

		<b>Bridge Division Standard</b>	
<b>CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT</b>			
<b>CSAB</b>			
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT	April 2019	0334 08	037 FM 154
02-20: Added Option 2.	DIST: YKM	COUNTY: FAYETTE	SHEET NO. 58

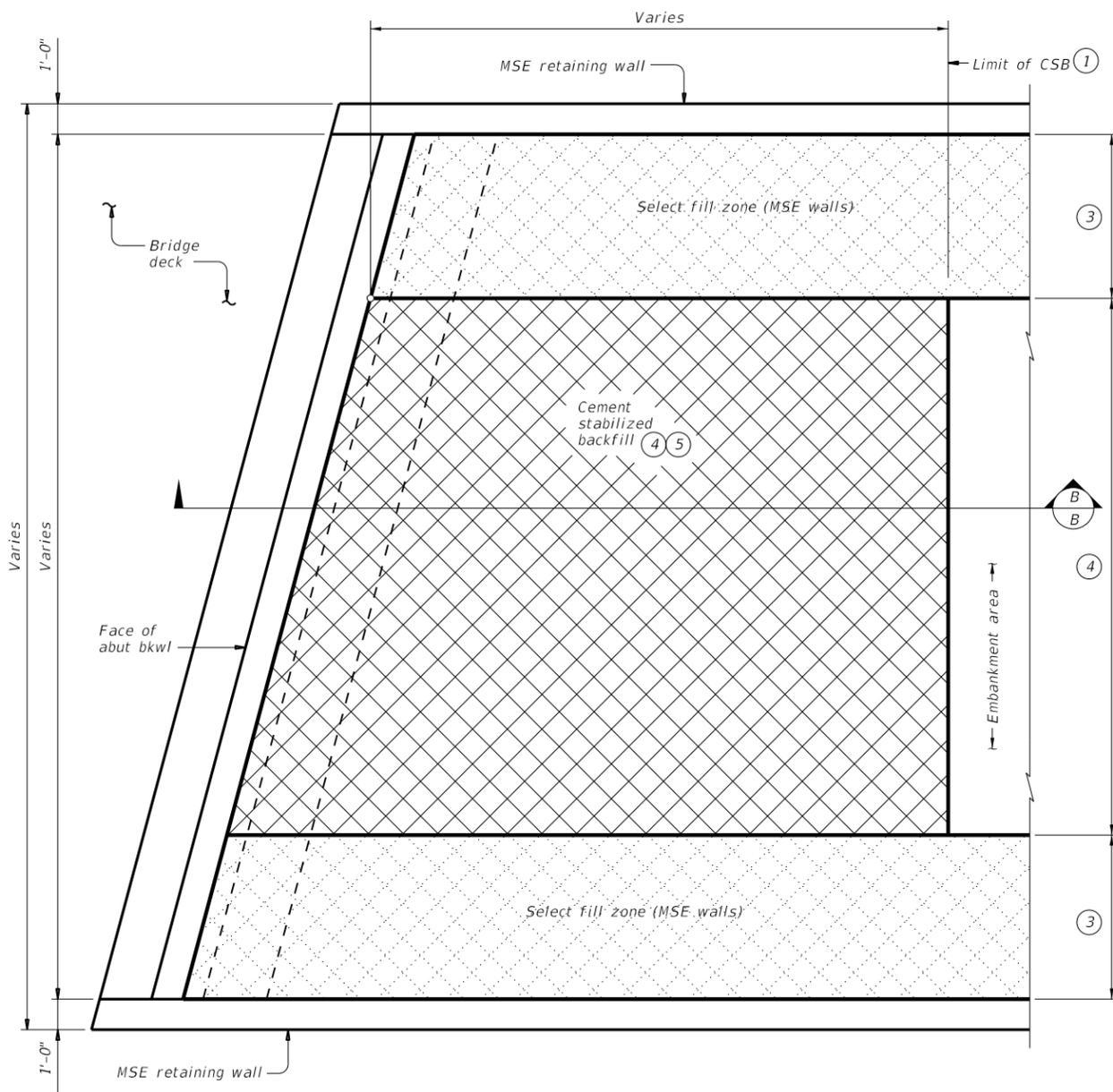
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 3/6/2023 4:23:20 PM  
 FILE: c:\pwworking\kno\pwwp\od\new\_user (1)\d0240571\csabste2-20.dgn



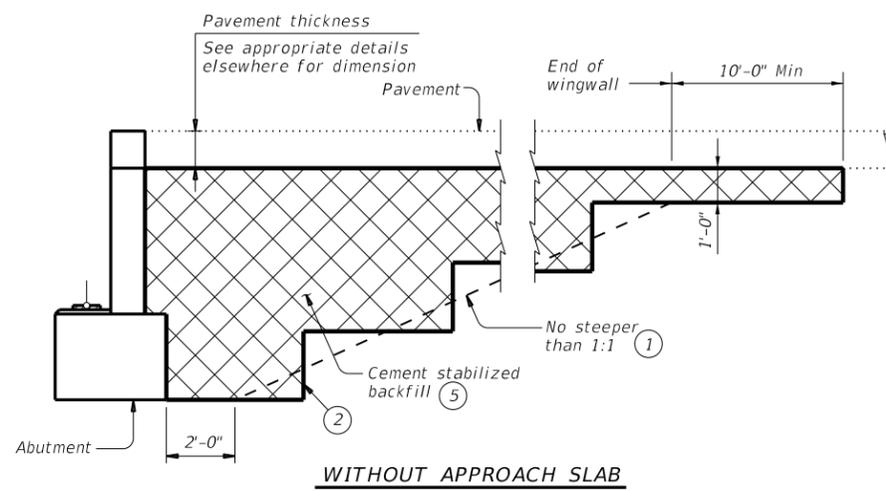
**OPTION 2 ~ PLAN WITH WINGWALLS**

Cast-in-place retaining walls similar.

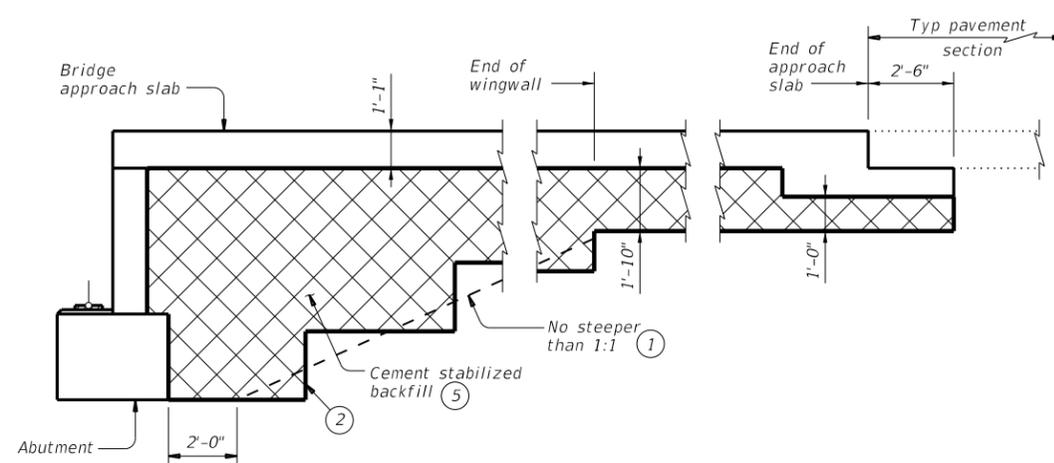


**OPTION 2 ~ PLAN WITH MSE RETAINING WALLS**

- ① Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
- ② Bench backfill as shown with 12" (approximate) bench depths.
- ③ Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- ④ When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.
- ⑤ If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
  - a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
  - b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



**WITHOUT APPROACH SLAB**



**SECTION B-B**

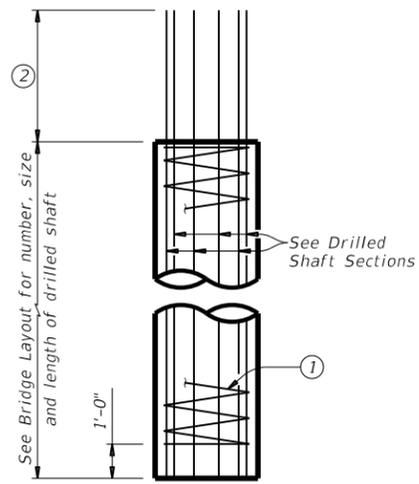
**WITH APPROACH SLAB**  
 (Showing BAS-C, BAS-A similar.)

SHEET 2 OF 2

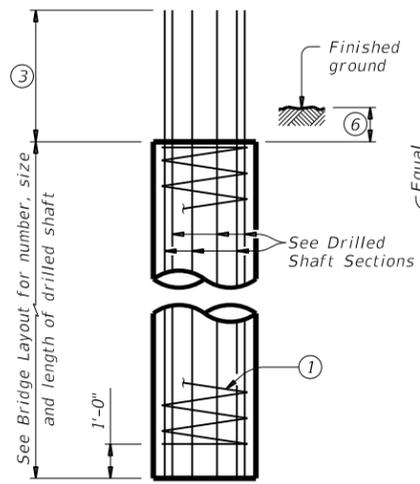
		<b>Bridge Division Standard</b>	
<b>CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT</b>			
<b>CSAB</b>			
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT April 2019	CONTRACT: 0334	SECTION: 08	JOB: 037
REVISIONS			HIGHWAY: FM 154
02-20: Added Option 2.	DIST: YKM	COUNTY: FAYETTE	SHEET NO.: 59

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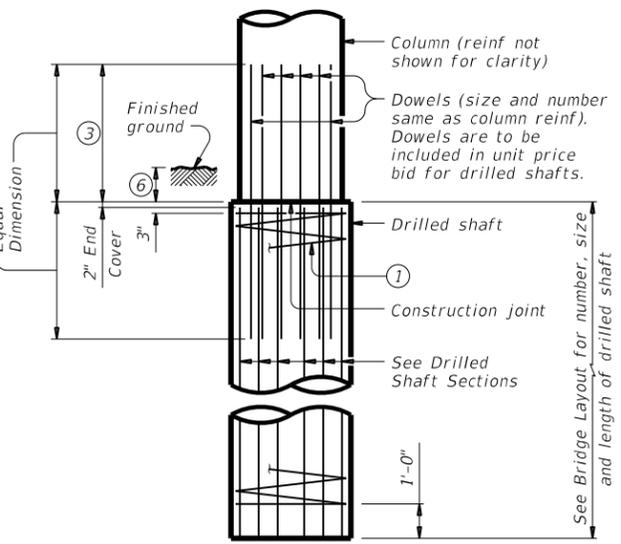
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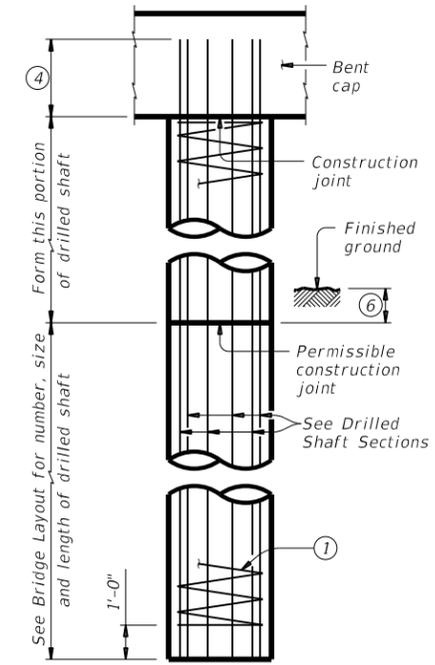
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



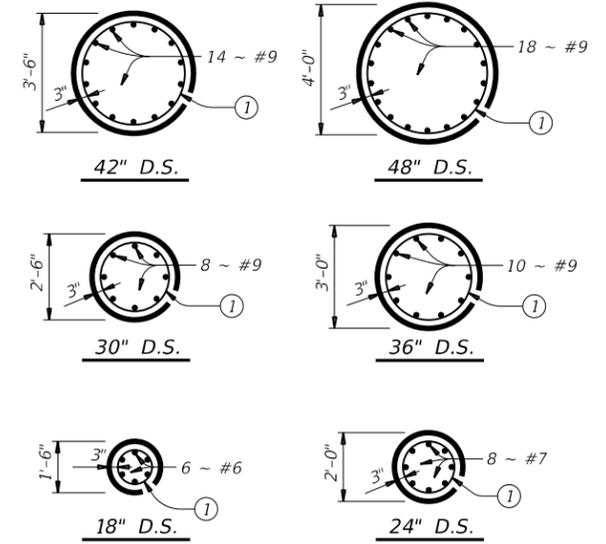
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

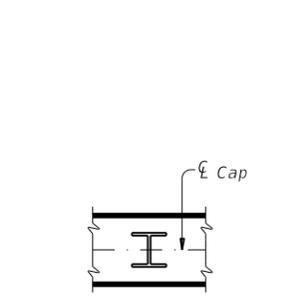


DRILLED SHAFT SECTIONS

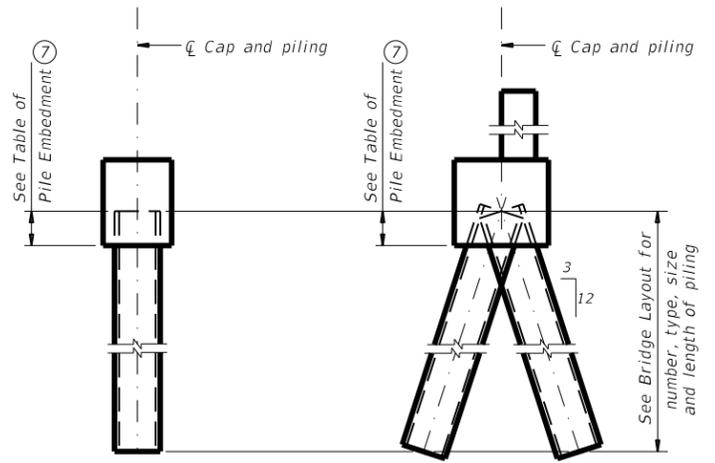
**DRILLED SHAFT DETAILS**

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

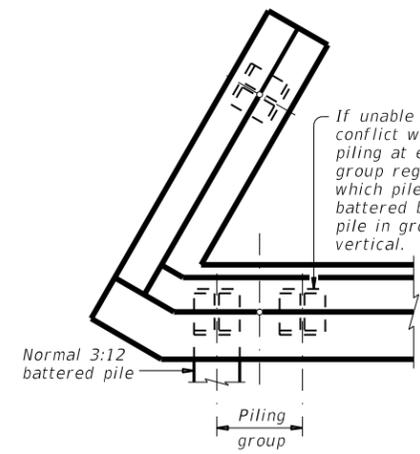


ORIENTATION OF STEEL H-PILING



VERTICAL PILE BATTERED PILE

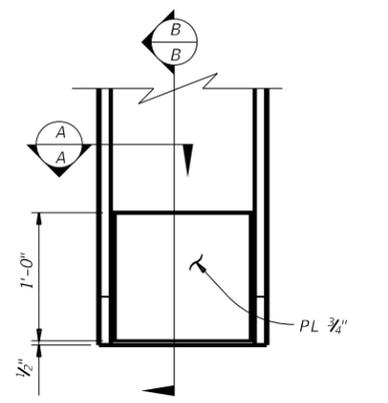
**PILING DETAILS**  
(Concrete or steel H)



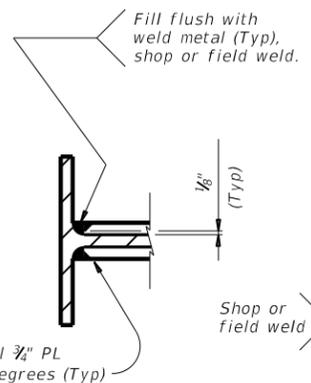
DETAIL "A"

(Showing plan view of a 30° skewed abutment)

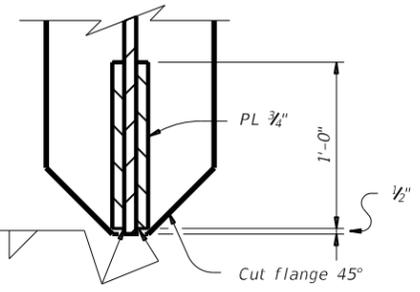
- ① #3 spiral at 6" pitch (one and a half flat turns top and bottom).
- ② Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-0"  
#9 Bars = 2'-3"
- ③ Min lap with column reinf:  
#7 Bars = 2'-11"  
#9 Bars = 3'-9"  
#11 Bars = 4'-8"
- ④ Min extension into supported element:  
#6 Bars = 1'-11"  
#7 Bars = 2'-3"  
#9 Bars = 2'-9"
- ⑤ Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.



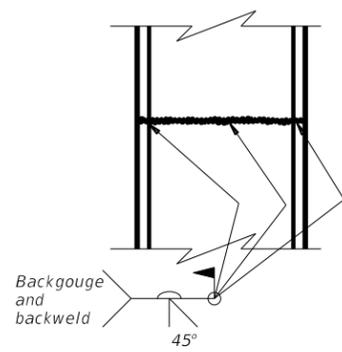
ELEVATION



SECTION A-A



SECTION B-B



SECTION THRU FLANGE OR WEB

**STEEL H-PILE SPLICE DETAIL**

Use when required.

**STEEL H-PILE TIP REINFORCEMENT**

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.

SHEET 1 OF 2

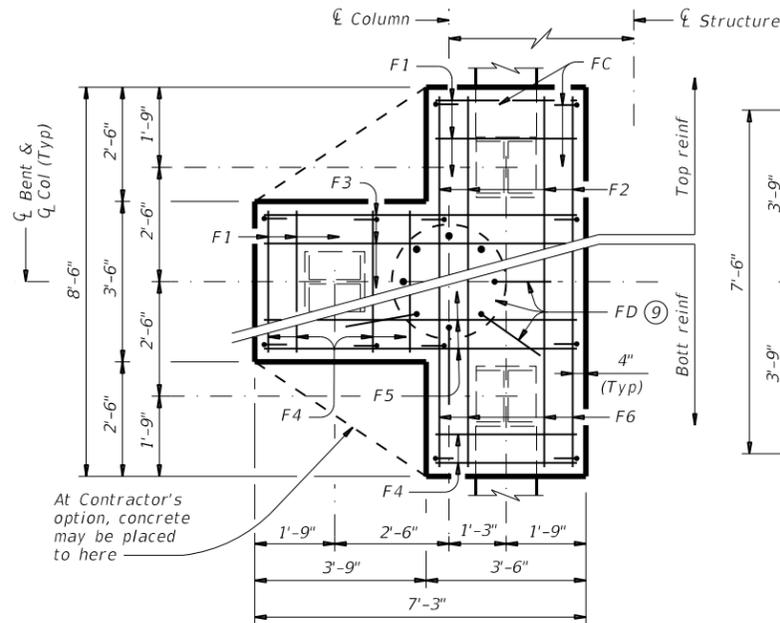
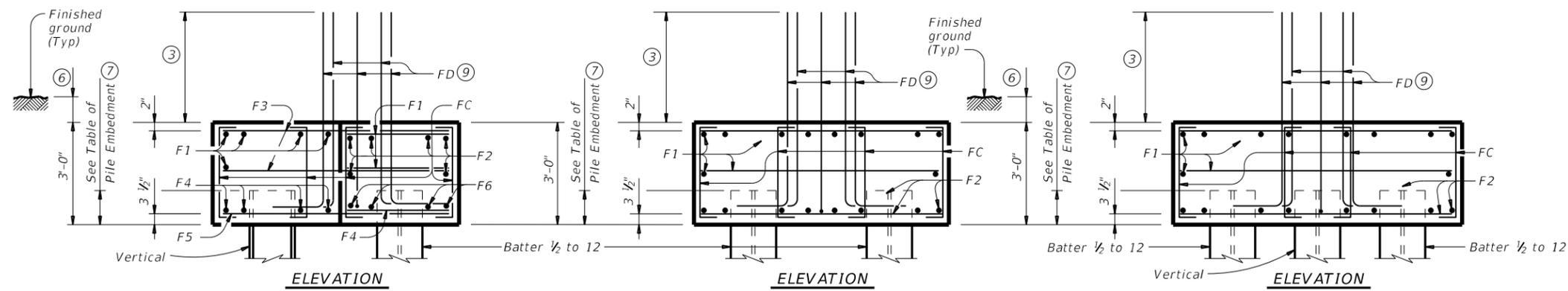
		Bridge Division Standard	
<b>COMMON FOUNDATION DETAILS</b>			
<b>FD</b>			
FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONTRACT	SECTION	HIGHWAY
0334	08	037	FM 154
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.
YKM	FAYETTE		60

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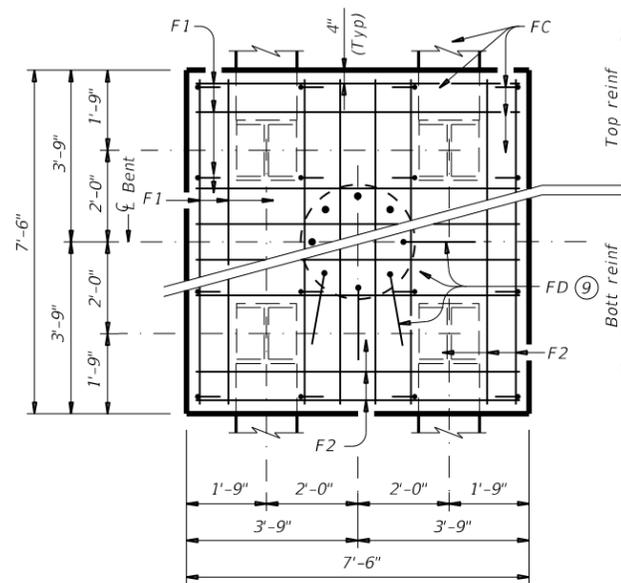
DATE: 3/6/2023 4:23:28 PM  
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### TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

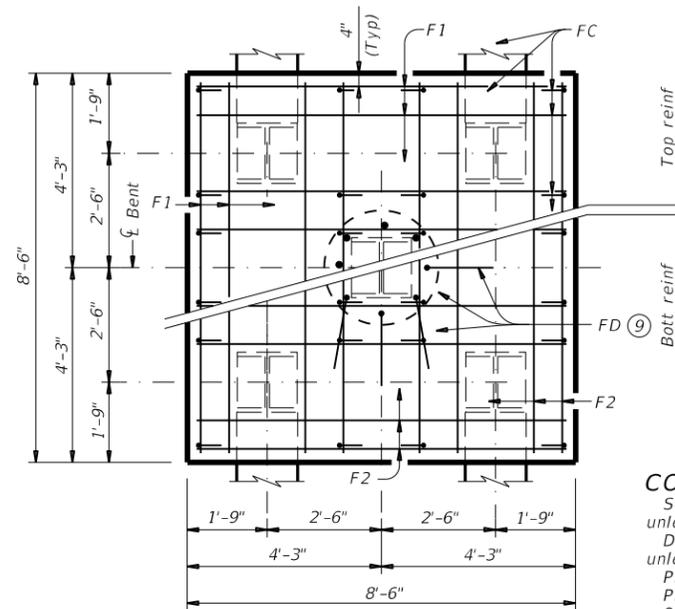
ONE 3 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	11	#4	3'- 2"	23	
F2	6	#4	8'- 2"	33	
F3	6	#4	6'- 11"	28	
F4	8	#9	3'- 2"	86	
F5	4	#9	6'- 11"	94	
F6	4	#9	8'- 2"	111	
FC	12	#4	3'- 6"	28	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	623
Class "C" Concrete				CY	4.8
ONE 4 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	7'- 2"	96	
F2	16	#8	7'- 2"	306	
FC	16	#4	3'- 6"	37	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	659
Class "C" Concrete				CY	6.3
ONE 5 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	8'- 2"	109	
F2	16	#9	8'- 2"	444	
FC	24	#4	3'- 6"	56	
FD <sup>⑩</sup>	8	#9	8'- 1"	220	
Reinforcing Steel				Lb	829
Class "C" Concrete				CY	8.0



**THREE PILE FOOTING<sup>⑧</sup>**  
 For 36" Dia and smaller columns.



**FOUR PILE FOOTING<sup>⑧</sup>**  
 For 42" Dia and smaller columns.



**FIVE PILE FOOTING<sup>⑧</sup>**  
 For 42" Dia and smaller columns.

**CONSTRUCTION NOTES:**

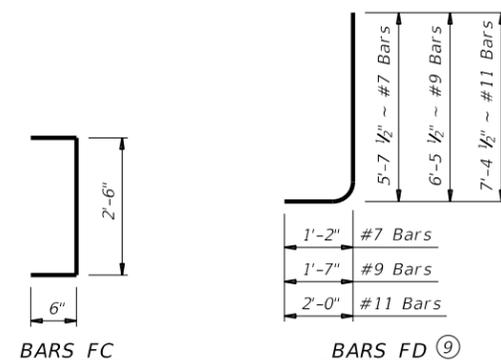
- See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.
- Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.
- Provide Class C Concrete ( $f'_c = 3,600$  psi), unless shown otherwise.
- Provide Grade 60 reinforcing steel.
- Galvanize reinforcing if shown elsewhere in the plans.
- Provide bar laps for drilled shaft reinforcing, where required, as follows:
  - Uncoated or galvanized (#6) ~ 2'-6"
  - Uncoated or galvanized (#7) ~ 2'-11"
  - Uncoated or galvanized (#9) ~ 3'-9"

**GENERAL NOTES:**

- Designed according to AASHTO LRFD Bridge Design Specifications.
- Cover dimensions are clear dimensions, unless noted otherwise.
- Reinforcing bar dimensions shown are out-to-out of bar.

**DESIGNER NOTES:**

- Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.
- Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.
- Maximum allowable pile loads for the footings shown are:
  - 72 Tons/Pile with 24" Dia Columns
  - 80 Tons/Pile with 30" Dia Columns
  - 100 Tons/Pile with 36" Dia Columns
  - 120 Tons/Pile with 42" Dia Columns



- ③ Min lap with column reinforcing:
  - #7 Bars = 2'-11"
  - #9 Bars = 3'-9"
  - #11 Bars = 4'-8"
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.
- ⑧ See Bridge Layout for type, size and length of piling.
- ⑨ Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.
- ⑩ Adjust FD quantity, size and weight as needed to match column reinforcing.



## COMMON FOUNDATION DETAILS

FD

FILE: fdstd01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
01-20: Added #11 bars to the FD bars.	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	61	

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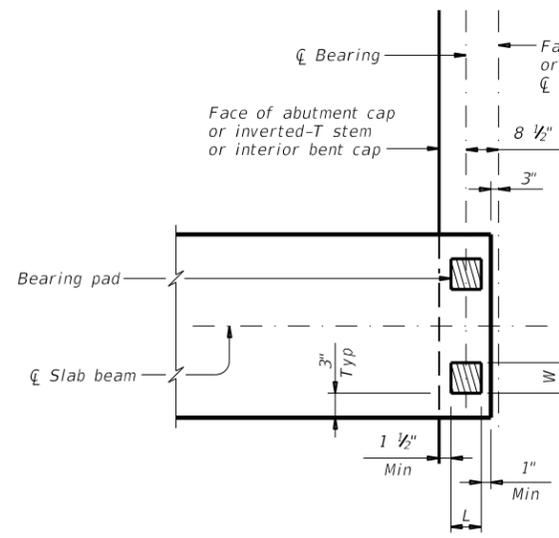
DATE: 3/6/2023 4:23:32 PM  
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**TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)**

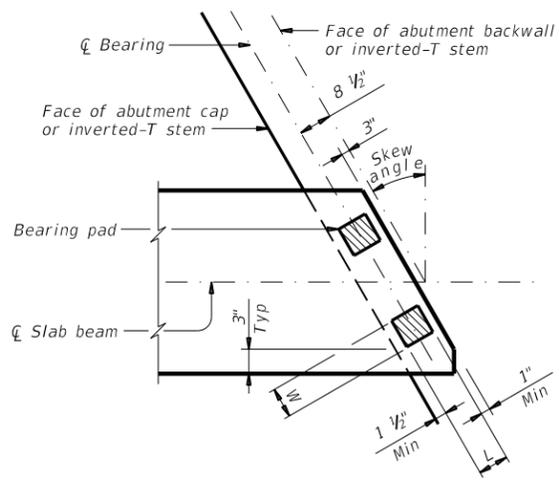
One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

Pad sizes shown are applicable for the following conditions:

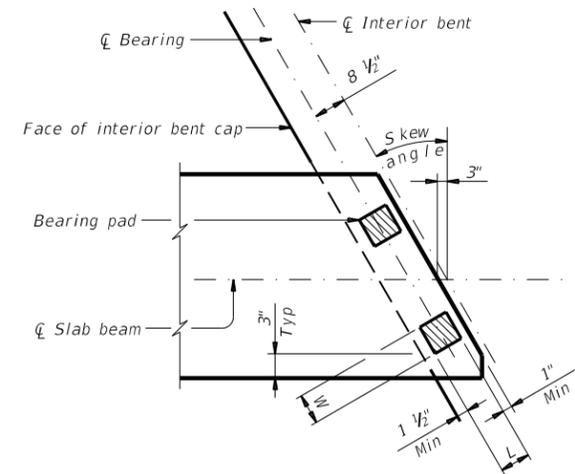
- (1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
- (2) Skews less than or equal to 30°.



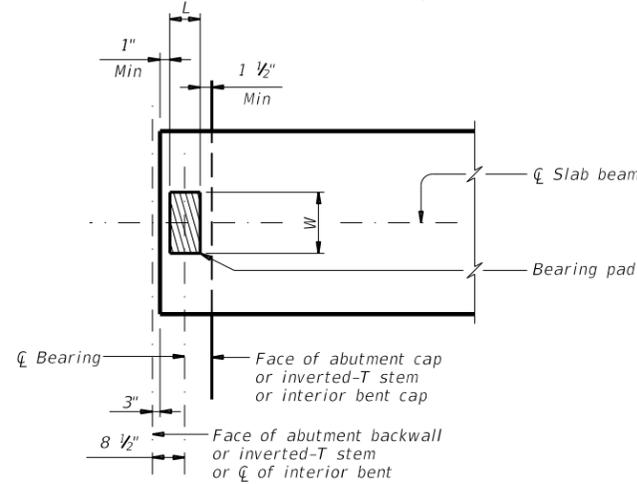
**TWO-PAD DETAIL PLAN**  
 (At abutment or inverted-T cap or at interior bent)



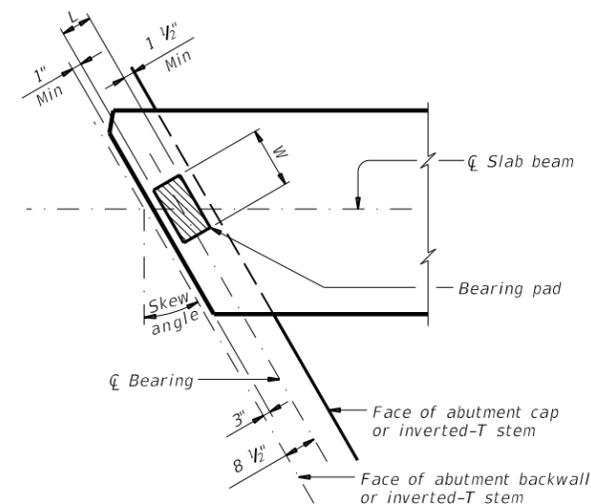
**TWO-PAD DETAIL SKEW PLAN**  
 (At abutment or inverted-T cap)



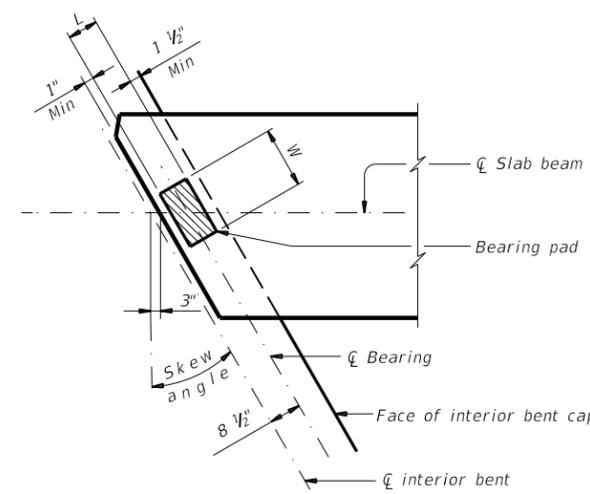
**TWO-PAD DETAIL SKEW PLAN**  
 (At interior bent)



**ONE-PAD DETAIL PLAN**  
 (At abutment or inverted-T cap or at interior bent)



**ONE-PAD DETAIL SKEW PLAN**  
 (At abutment or inverted-T cap)

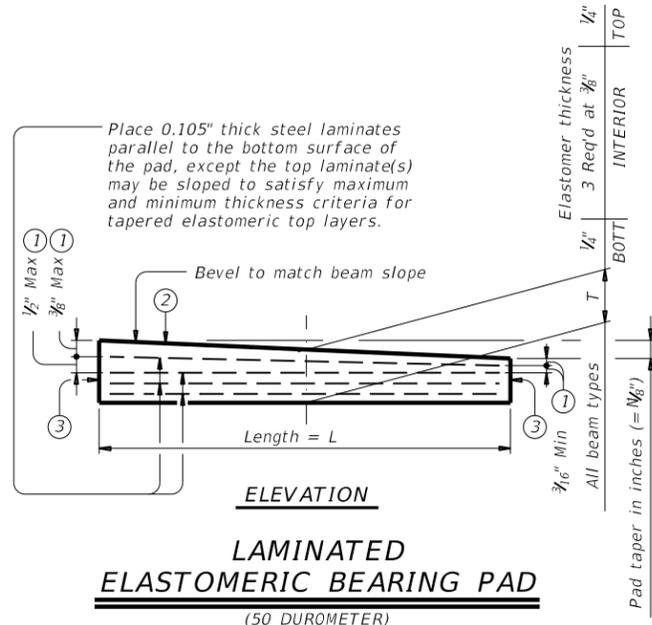


**ONE-PAD DETAIL SKEW PLAN**  
 (At interior bent)

**GENERAL NOTES:**  
 These details accommodate skew angles up to 30°. Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer. Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

**ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS**

Place one bearing pad at forward station beam end.  
 Place two bearing pads at back station beam end.



**LAMINATED ELASTOMERIC BEARING PAD**  
 (50 DUROMETER)

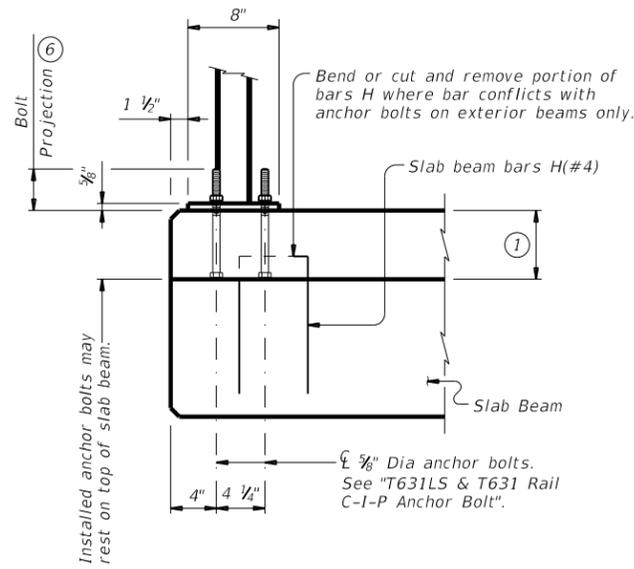
- ① Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ② Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in 1/8" increments) in this mark. Examples: N=0, (for 0" taper) N=1, (for 1/8" taper) N=2, (for 1/4" taper) (etc.) Fabricated pad top surface slope must not vary from plan beam slope by more than  $(\frac{0.0625}{Length})$  IN/IN.
- ③ Locate permanent mark here.

HL93 LOADING

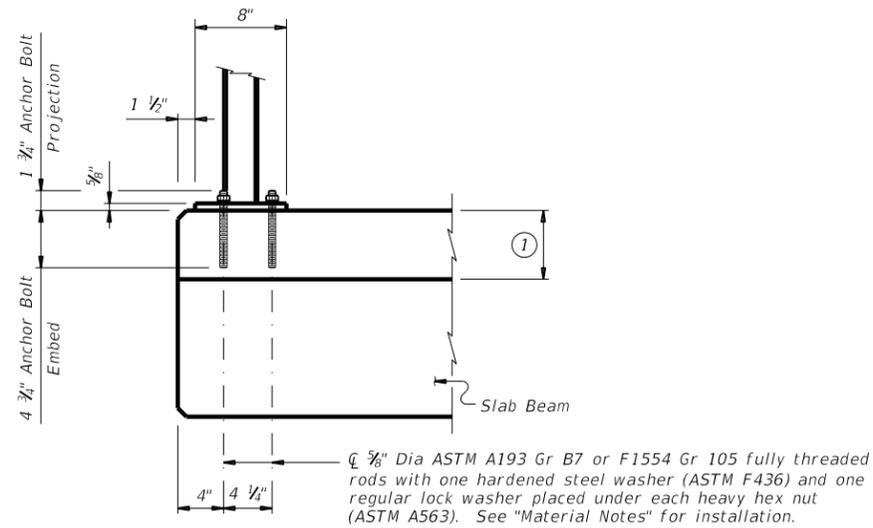
Texas Department of Transportation		Bridge Division Standard	
<b>ELASTOMERIC BEARING AND BEAM END DETAILS</b>			
<b>PRESTR CONCRETE SLAB BEAM</b>			
<b>PSBEB</b>			
FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT
©TxDOT January 2017	CONT	SECT	JOB
REVISIONS	0334	08	037
DIST	COUNTY		SHEET NO.
YKM	FAYETTE		62

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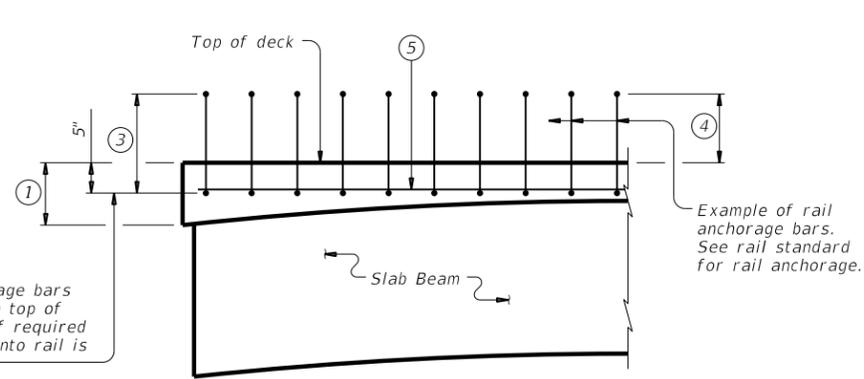


**CAST-IN-PLACE ANCHORAGE OPTION**

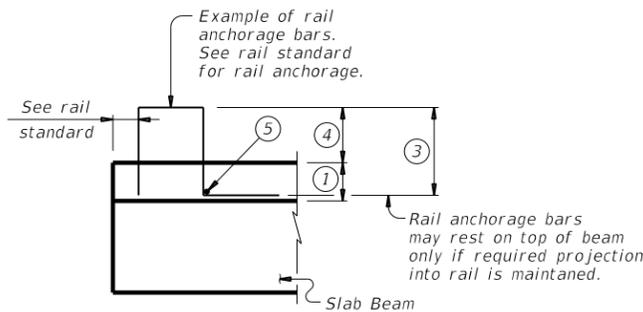


**ADHESIVE ANCHORAGE OPTION**

**T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)**



**PART SPAN ELEVATION**

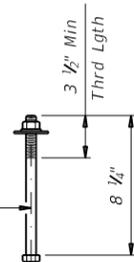


**SECTION**

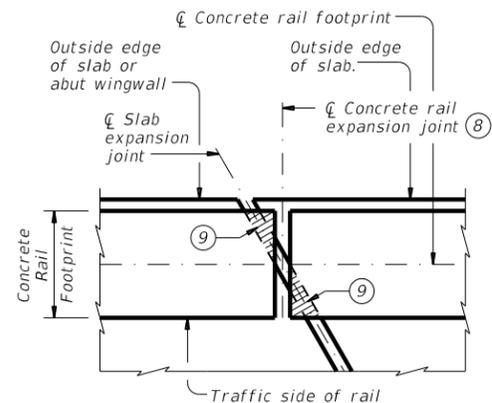
**TYPICAL CONCRETE RAIL ANCHORAGE**

(Showing typical concrete rail anchorage)

3/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563).



**T631LS & T631 RAIL C-I-P ANCHOR BOLT**



**PLAN OF CONCRETE RAILS AT EXPANSION JOINTS**

- ① Cast-in-place slab thickness varies due to beam camber (5" minimum).
- ② Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
- ③ Bar length shown on rail standard, minus 1 1/4". Adjust bar length for a raised sidewalk.
- ④ See rail standard for projection from finished grade or top of sidewalk.
- ⑤ Place additional (#5) longitudinal bar.
- ⑥ Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than 1/2" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
- ⑦ Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)  
30° Skew: 1'-3" (acute corner only)
- ⑧ Location of rail expansion joint must be at the intersection of slab expansion joint, rail footprint and perpendicular to slab outside edge.
- ⑨ Cross-hatched area must have 1/2" preformed bituminous fiber material under concrete rail, as shown.

**CONSTRUCTION NOTES:**

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.  
 Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

**MATERIAL NOTES:**

Galvanize all steel components of steel rail system.  
 Provide Grade 60 reinforcing steel.  
 Cast-in-place anchorage system for T631LS and T631 Rail must be 3/8" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 1/2" minimum.  
 Adhesive anchors for T631LS and T631 Rail must be 3/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."  
 Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

**GENERAL NOTES:**

Designed in accordance with AASHTO LRFD Bridge Design Specifications.  
 This standard is for use with structures with a 5" minimum cast-in-place concrete slab.  
 This standard may require modification for interior rails. This standard does not apply to median barriers.  
 This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.  
 See rail standards for approved speed restrictions, notes and details not shown.

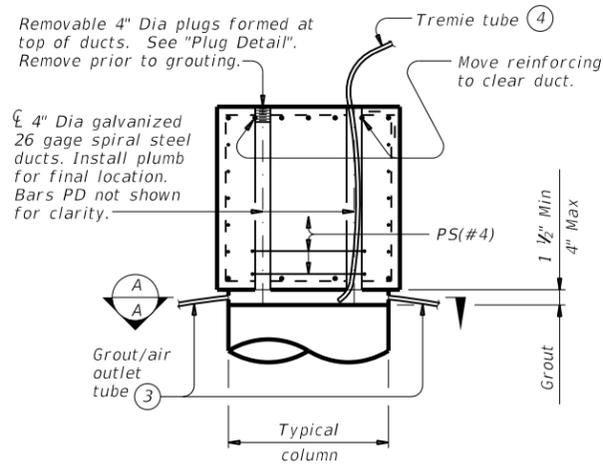
Cover dimensions are clear dimensions, unless noted otherwise.

		<b>Bridge Division Standard</b>	
<b>RAIL ANCHORAGE DETAILS</b>			
<b>PRESTR CONCRETE SLAB BEAMS</b>			
<b>PSBRA</b>			
FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT January 2017	CONTRACT	SECTION	JOB
REVISIONS	0334	08	037
03-18: Updated adhesive anchor notes.	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	63



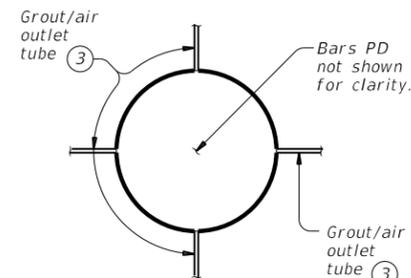
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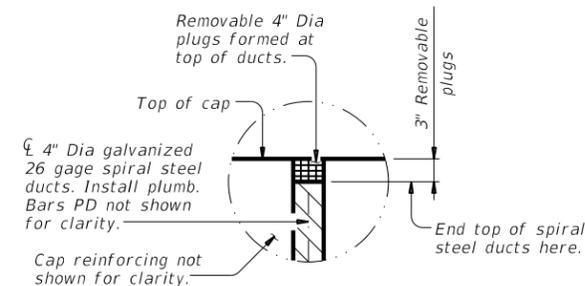


**TYPICAL SECTION THRU CAP**

(Showing example of ducts and cap reinforcing.)



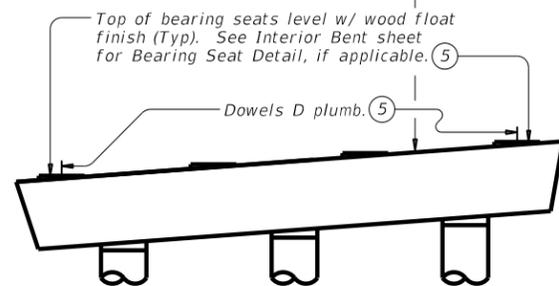
**SECTION A-A**



**PLUG DETAIL**

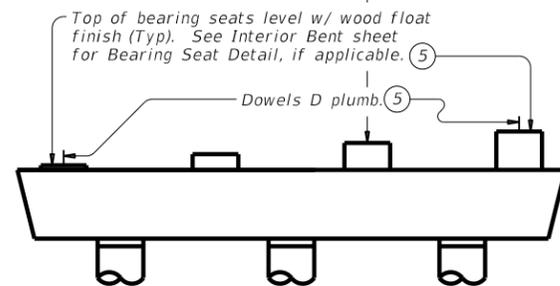
(Plug is used to keep concrete out of ducts during concrete placement. Remove prior to grouting)

Slope top of cap between bearing seats in accordance with Item 420.4.9 "Treatment and Finishing of Horizontal Surfaces", unless directed otherwise by the Engineer.



**CAP SET AT SLOPE**

Reinforce bearing seats over 3" tall and slope top of cap between bearing seats in accordance with Item 420.4.9 "Treatment and Finishing of Horizontal Surfaces", unless directed otherwise by the Engineer.



**CAP SET LEVEL**

**EXAMPLES OF PRECAST BENTS WITH DOWELS D**

- ③ Provide at least 4 grout/air outlet tubes equally spaced around the perimeter of the column. Install at bottom of cap to avoid air entrapment. Seal off tubes sequentially when a steady flow of grout without air occurs. Secondary tubes to help drain water, located at top of column, may also be installed.
- ④ Continuous gravity-flow grouting through a tremie tube is recommended. With this method, lower a flexible tremie tube through one of the vertical ducts to the bottom of the bedding layer and fill the connection from the bottom upward with a continuous flow of grout. This method requires a sufficient amount of grout to be mixed prior to grouting and that the funnel connected to the tremie tube have adequate volume capacity (4 quarts Min is recommended). A valve may be used to stop the flow during grouting to allow refilling the funnel or to tamp the grout. The tube should remain within the grout and gradually withdrawn as the level of the grout rises in the ducts. It is critical to ensure a continuous flow of grout to avoid air entrapment. Alternative methods, including pressure grouting with low pressure pumps, may be used provided they are proved effective in providing void-free connections during the mock-up phase.
- ⑤ Unless otherwise shown.

**CONSTRUCTION NOTES:**

**Cap Fabrication:**

Construct and cure cap in accordance with Item 420, "Concrete Substructures". If fabricated at an offsite location, construct and cure cap in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Secure ducts to prevent their movement during concrete placement. Location tolerance of ducts is 1/4" from plan location, transversely and longitudinally. Seal ducts to prevent intrusion of concrete.

Bearing seats may be precast with the cap. Bearing seats over 3" in height must be reinforced as per Item 420.4.9. Do not locate lift points at bearing seats if bearing seats are precast.

Cap concrete must achieve a compressive strength of 2,500 psi prior to lifting. Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps. Caps that become cracked or otherwise damaged may be rejected.

**Cap-to-Column Connection:**

Make a trial batch of grout using the same material, equipment and personnel to be used for actual grouting operations and grout a mock-up of the connection at least one week before grouting and in the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the same level required for the actual grouting.

Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to grouting. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.

Surfaces in contact with grout must be clean and in a saturated, surface-dry condition, immediately prior to grouting. Provide water tight forms. Fill the forms with water and drain just prior to grouting. Ponding or free-standing water is not permitted. Use compressed air to blow out excess water.

Mix grout in accordance with the manufacturer's directions. Evidence of frothing, foaming, or segregation is cause for rejection. Transport grout from mixer to final location by wheel barrow, bucket or pumping.

Perform sampling and testing of grout by trained personnel at the Contractor's expense and while witnessed by the Engineer. Grouted connections must be free of voids.

Trowel finish top surface of cap anchorage ducts flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

Friction collars may be removed, if used, and beams placed on the cap after the grout obtains a compressive strength of 2,500 psi. Subsequent loading can occur when the grout reaches its final required 28 day compressive strength.

**MATERIAL NOTES:**

Provide a pre-qualified grout from TxDOT's Material Producer List "Cementitious Grouts and Mortars for Miscellaneous Applications", conforming to DMS-4675.

Provide semi-rigid spirally crimped, corrugated duct of galvanized, cold rolled steel conforming to ASTM A653. Corrugations must have a minimum amplitude of 0.094".

Grout tubes and forms must be approved prior to grouting.

Provide Grade 60 reinforcing steel. Epoxy coat or galvanize all reinforcement if column reinforcement is epoxy coated or galvanized.

**GENERAL NOTES:**

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

The Contractor has the option to provide precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses precast caps.

Submit shop drawings of precast caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.

Precast Concrete Bent Cap Option shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

See Interior Bent sheet for details and notes not shown.

Reinforcing bar dimensions shown are out-to-out of bar.



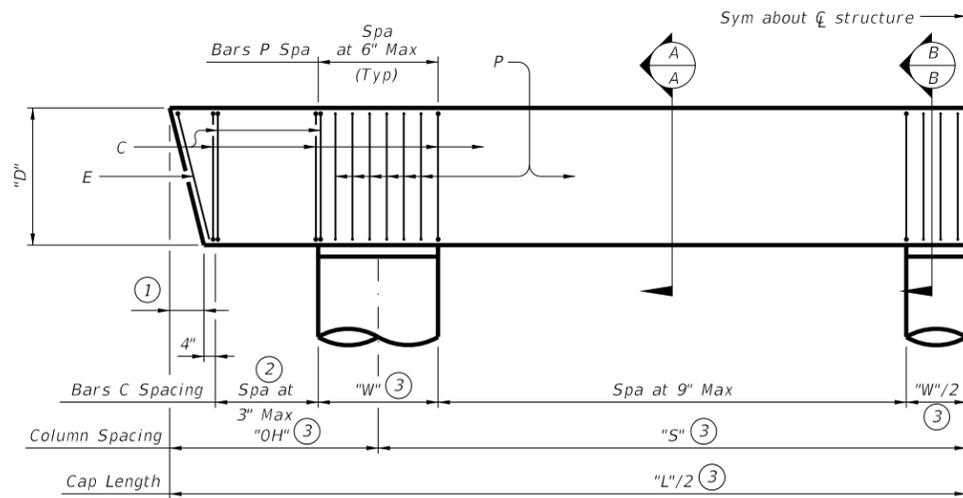
**PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS**

**PBC-RC**

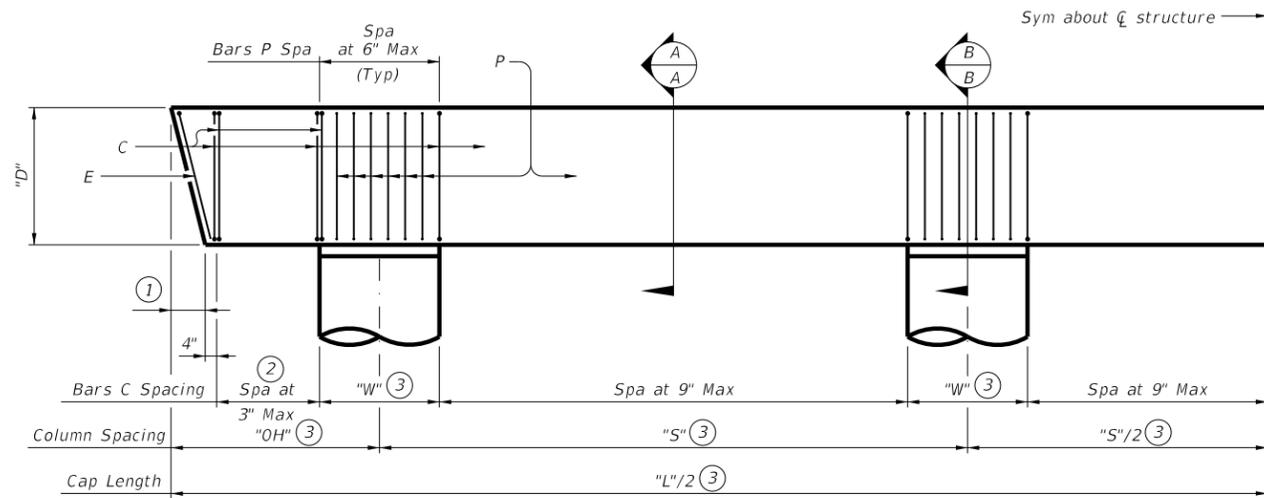
FILE: pbcstd01-21.dgn	DN: TxDOT	CK: JMH	DW: JTR	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: General Notes	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		65	

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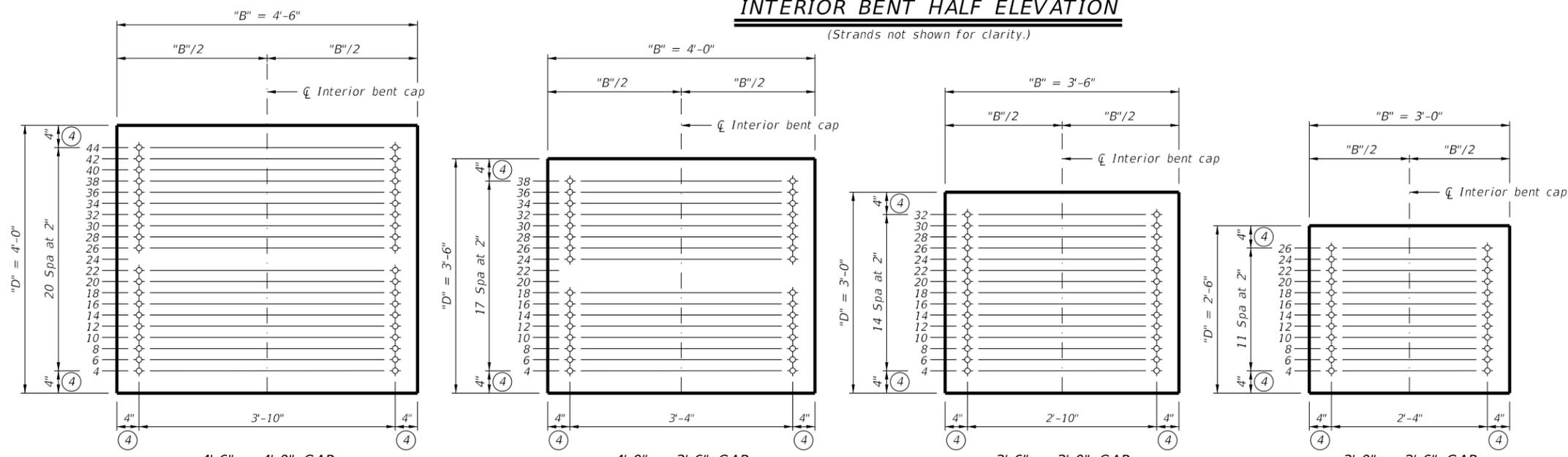


SHOWING 3 COLUMN BENT



SHOWING 4 COLUMN BENT

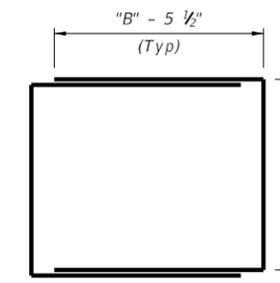
**INTERIOR BENT HALF ELEVATION**  
 (Strands not shown for clarity.)



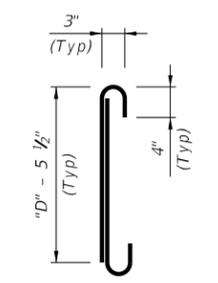
**INTERIOR BENT CAP SECTIONS**  
 (Showing strands only.)

**TABLE OF CAP DESIGNS**

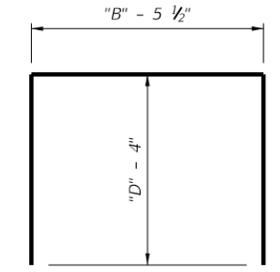
SUPERSTRUCTURE TYPE	CAP DIMENSIONS			CONCRETE		PRESTRESSING STRANDS				REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)
	CAP WIDTH "B" (ft-in)	CAP DEPTH "D" (ft-in)	CORRUGATED PIPE INSIDE DIAMETER (ft-in)	RELEASE STRENGTH $f'_{ci}$ (ksi)	MINIMUM 28 DAY COMP STRENGTH $f'_c$ (ksi)	LAYERS OF PS STRANDS	TOTAL NO. PS STRANDS	SIZE (in)	STRENGTH (ksi)	
Slab Beams	3'-0"	2'-6"	1'-6"	4.0	5.0	12	24	0.6	270	1,201
Decked Slab Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
Box Beams	3'-6"	3'-0"	2'-0"	4.0	5.0	15	30	0.6	270	1,886
X-Beams	4'-0"	3'-6"	2'-6"	5.2	6.5	16	32	0.6	270	2,671
I-Girders (Tx28-Tx54)	4'-0"	3'-6"	2'-6"	4.0	5.0	16	32	0.6	270	2,484
I-Girders (Tx62)	4'-6"	4'-0"	3'-0"	4.0	5.0	20	40	0.6	270	3,634



BARS C (#5)  
Showing one complete bar.

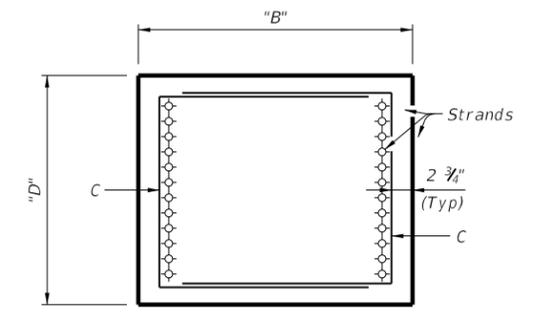


BARS P (#3)  
Showing one complete bar.

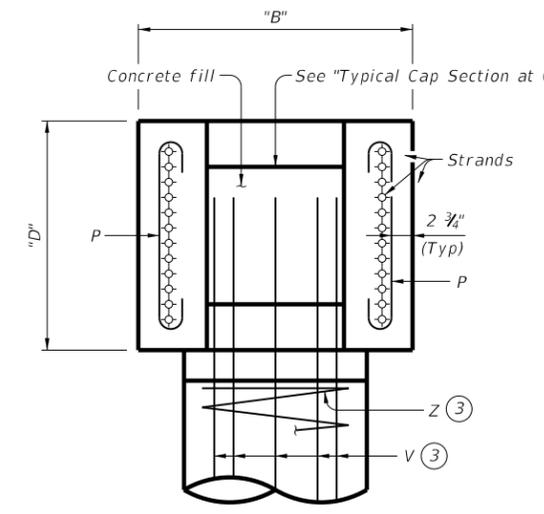


BARS E (#5)

- ① Variable. See Interior Bents sheet for dimension. When dimension is 0', omit Bars E and reduce end cover to Bars C to 3". Measured parallel to top of cap cross-slope.
- ② Double Bars C. (Typ)
- ③ See Interior Bents sheet for details not shown.
- ④ Dimensioned to center of strand.



SECTION A-A



SECTION B-B

HL93 LOADING SHEET 1 OF 2



**PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS**

**PPBC-RC**

FILE: ppbcstd1-21.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
©TxDOT April 2019	CON: 0334	SECT: 08	JOB: 037	HIGHWAY: FM 154
12-21: General Notes	DIST: YKM	COUNTY: FAYETTE	SHEET NO. 66	

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SUPERSTRUCTURE TYPE	BEARING DIMENSIONS	
	"BW" (ft-in)	
X-Beams	6'-0"	
I-Girders (Tx28-Tx54)	3'-0"	
I-Girders (Tx62)	3'-0"	

**CONSTRUCTION NOTES:**

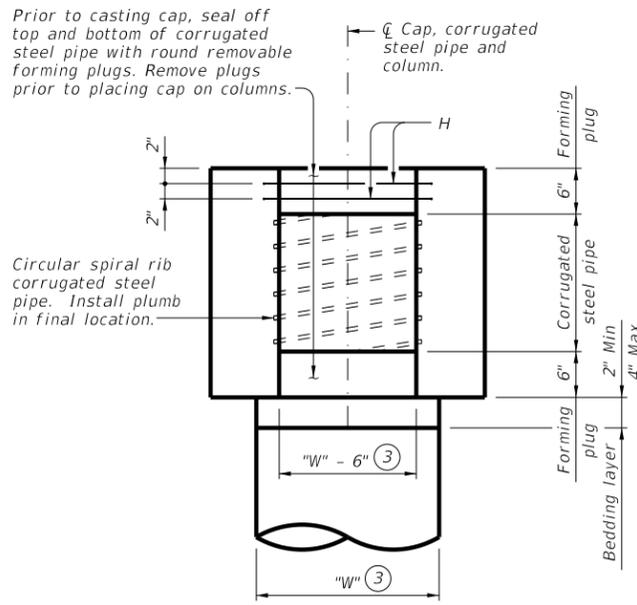
**Cap Fabrication:**  
 Fabricate in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Secure corrugated metal pipes to prevent their movement during concrete placement. Location tolerance of pipes is 1/4" from plan location, transversely and longitudinally. Seal pipes to prevent intrusion of concrete.  
 Chamfer or round all exposed corners 3/4".  
 Repair cracks exceeding 0.005 in. in width as directed. The fabricator must take approved corrective actions if cracks greater than 0.005 in. form. All work, material, and engineering related to these cracks will be at the Contractor's expense.  
 Caps can be set level or at grade. If required or needed, build bearing seats/pedestals to achieve final grade. Bearing seats/pedestals may be precast with the initial cast. Bearing seats/pedestals that conflict with column locations may not be precast with cap. Do not locate lift points at bearing seats/pedestals if bearing seats/pedestals are precast. If bearing seats/pedestals are not precast, cast in accordance with Item 420.4.9, "Treatment and Finishing of Horizontal Surfaces". Do not slope the top of caps between bearing areas from the center slightly towards the edge. If pedestal reinforcement is not present, drill and epoxy anchor Bars EB1 and EB2 into top of cap in accordance with Item 420.4.7.10, "Installation of Dowels and Anchor Bolts".  
 If earwalls are required, see Interior Bents sheet for details.  
 If shear keys are required elsewhere in plans, submit details. Shear keys may not be precast. Drill and epoxy shear key anchor reinforcement into top of cap in accordance with Item 420.4.7.10 "Installation of Dowels and Anchor Bolts".  
 Limit flexural stress in cap to 250 psi during handling and storage. Store and handle caps in accordance with Item 424, "Precast Concrete Structural Members (Fabrication)". Do not stack caps.

**Cap-to-Column Connection:**  
 Construct a mock-up of the column-to-cap connection that must demonstrate the ability of the Contractor to provide a connection free of voids. In the presence of the Engineer, use trial batch of concrete fill using the same material, equipment, and personnel to be used for actual concrete operations and fill the mock-up at least one week before casting concrete. Field test the trial batch of concrete fill to the same levels required for the actual concrete fill depth.  
 Caps may be placed on columns/drilled shafts after column/drilled shaft concrete has achieved a flexural stress of 355 psi (or 2,500 psi compressive strength). Use plastic shims or friction collars to support the cap at the proper elevation prior to concrete fill depth. Total area of plastic shims used on top of each column may not exceed 6 percent of the column area. Column/drilled shaft curing may be interrupted a maximum of 2 hours for placement of plastic shims or friction collars and cap placement.  
 Provide mortar tight forms. Ensure the top of the column is in a saturated surface dry (SSD) condition just before placing concrete fill. Deposit concrete such that all voids in the bedding layer and bent cap are completely filled. Deposit concrete through the top opening of the cap pocket in a manner that deposits concrete from the bedding layer on the bottom of the connection upward. Vibrate concrete in the pocket in accordance with Item 420.4.7.9, "Consolidation". Trowel finish top surface of cap pockets flush with top of cap. Wet mat cure these locations for at least 48 hours. Recess lifting loops 1-inch minimum using exothermic cutting rods. Do not overheat or damage the surrounding concrete. Abrade the concrete surfaces of excavation and end of the lifting loop to remove all slag with a needle gun, steel brush, or other suitable means. Coat the inside of the recessed area, including the lifting loops, with 10 mils (minimum) of neat, Type VIII epoxy and patch the recess with epoxy mortar.

**MATERIAL NOTES:**  
 Provide 12 gage, Type 1, lock-seam, helical corrugated pipe conforming to Item 460, "Corrugated Metal Pipe".  
 Provide Grade 60 reinforcing steel. Do not epoxy coat reinforcement even if column reinforcement is epoxy coated.  
 Provide Class "H" (HPC) concrete for cap concrete.  
 Provide Class "C" or "S" concrete for cap-to-column connection concrete fill.  
 Use low relaxation strands, each pretensioned to 75% of  $f_{pu}$ .

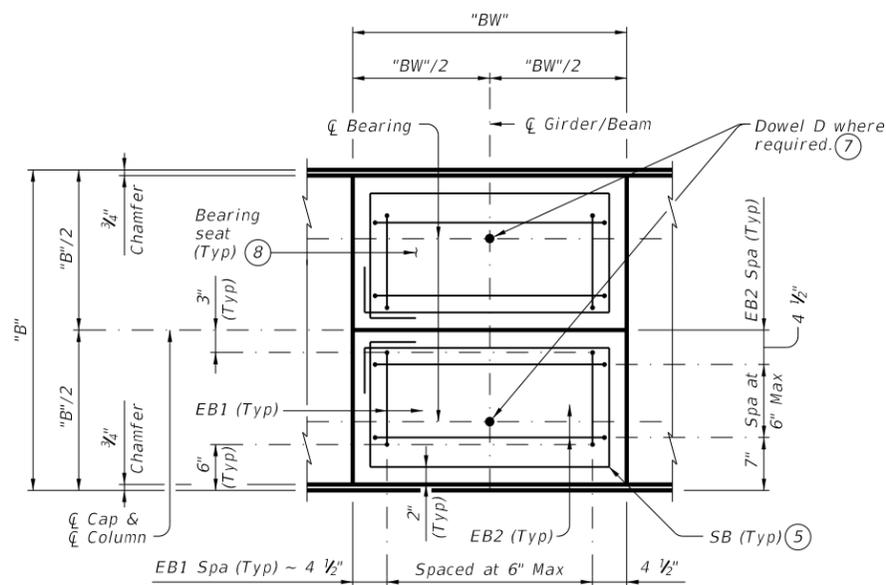
**GENERAL NOTES:**  
 Designed in accordance with AASHTO LRFD Bridge Design Specifications.  
 Prestress loss calculated according to Research Report FHWA/TX-12/0-6374-2 Table 6.6 using a relative humidity of 60 percent.  
 The Contractor has the option to provide prestressed, precast bent caps in accordance with the details shown. No additional payment will be made if the Contractor uses prestressed, precast bent caps.  
 Submit shop drawings of prestressed, precast bent caps for approval prior to construction. Indicate lifting attachments and locations on the shop drawings.  
 Corrugated pipe and concrete fill are subsidiary to Item 420, "Concrete Substructures" or Item 425, "Precast Prestressed Concrete Structural Members", whichever is designated as the bid item.  
 See standard Interior Bents sheet for details and notes not shown.

These details can only be used as an alternate to standard Interior Bents with round columns for slab beams, decked slab beams, box beams, X-beams, and I-girder standard designed structures.  
 Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.

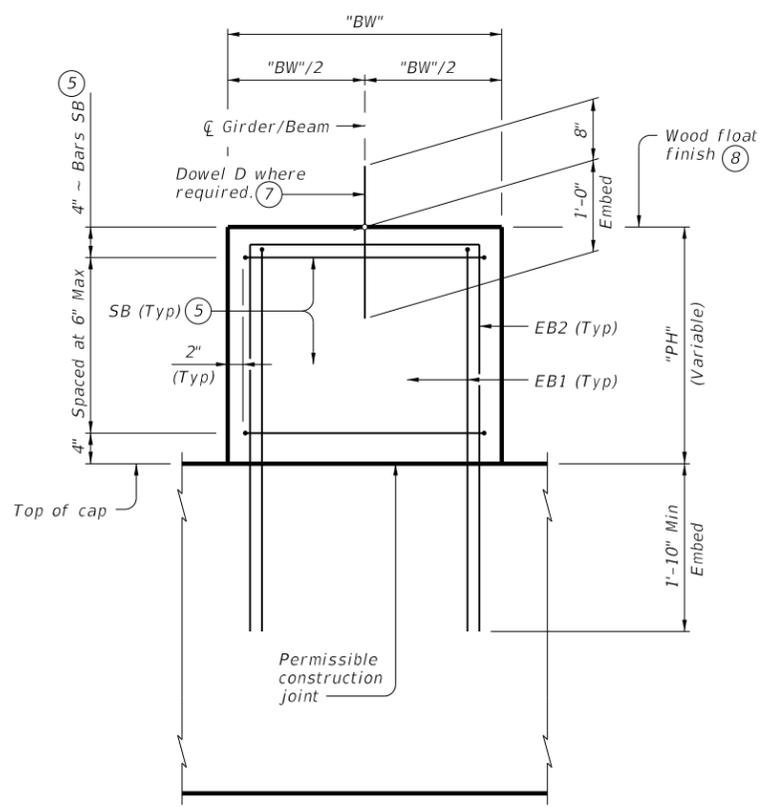


**TYPICAL CAP SECTION AT COLUMN**

Showing example of cap and corrugated steel pipe at column. Cap and column reinforcing not shown for clarity.



**PLAN**

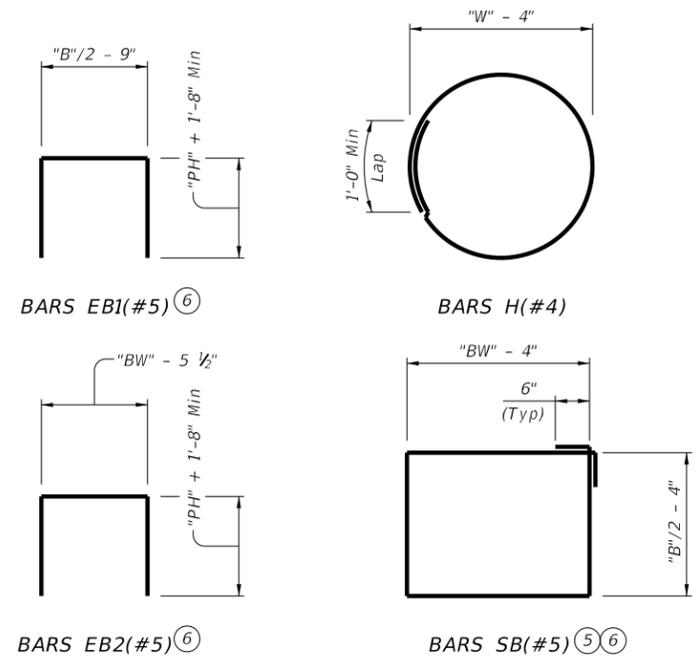


**ELEVATION**

**PEDESTAL DETAILS**

Clean bearing surface and all loose material before placing bearing pad. Reinforce bearing seats/pedestals over 3" in height as shown.

- ③ See Interior Bents sheet for details not shown.
- ⑤ Omit Bars SB for pedestal heights ("PH") under 1'-0".
- ⑥ Shown for structures without skew. Details are for "PH" heights greater than 3" and less than 18". Details are shown for standard X-Beams and I-Girders. Submit details as part of the shop drawing submittal for skewed structures and for pedestals greater than 18" in height.
- ⑦ See Interior Bents sheet for placement of dowels. Place dowels plumb.
- ⑧ See Interior Bents sheet, Bearing Seat Detail for slope.



SHEET 2 OF 2

HL93 LOADING

**Texas Department of Transportation**

**PRESTRESSED, PRECAST BENT CAP OPTION FOR ROUND COLUMNS**

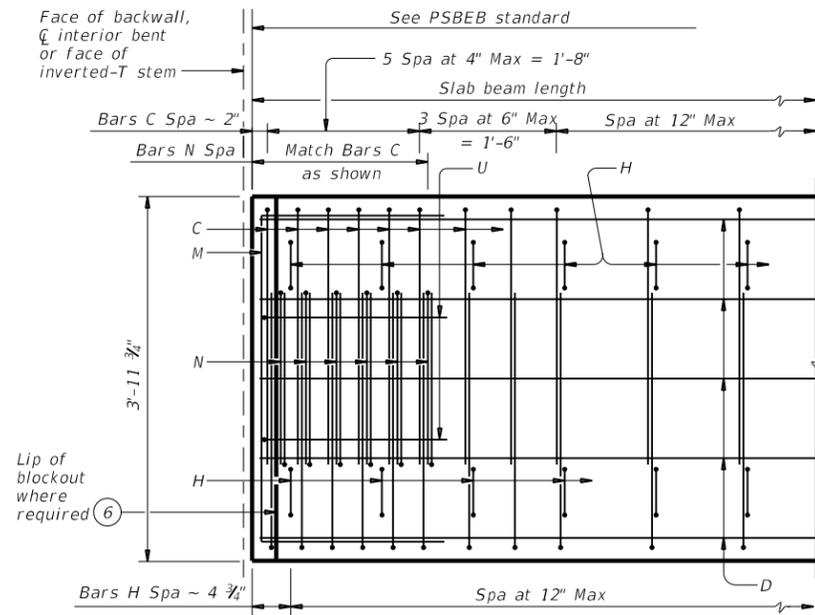
**PPBC-RC**

FILE: ppbcstd1-21.dgn	DN: CPM	CK: AJF	DW: JTR	CK: CPM
©TxDOT April 2019	CONTRACT	SECTION	JOB	HIGHWAY
12-21: General Notes	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		67	

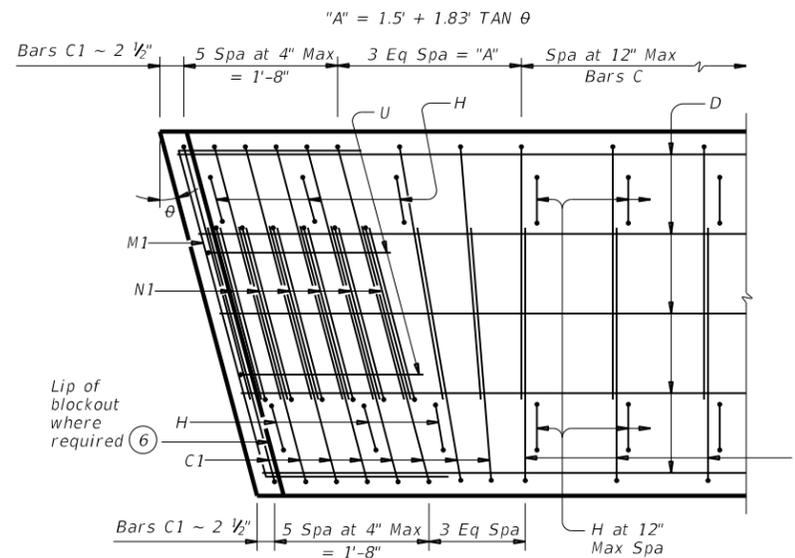
Bridge Division Standard

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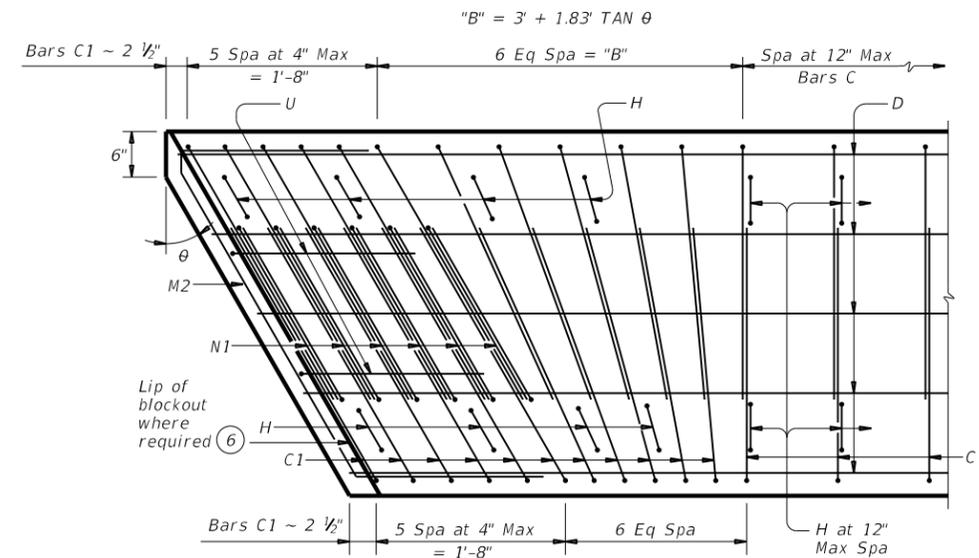


**PART PLAN**



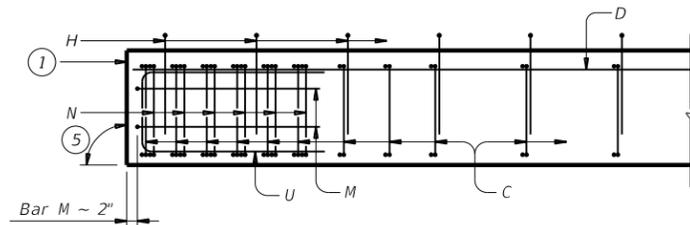
**PART SKEW PLAN**

(Showing θ over 0° to 15° Skew)

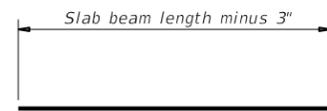


**PART SKEW PLAN**

(Showing θ over 15° to 30° Skew)



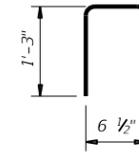
**ELEVATION**



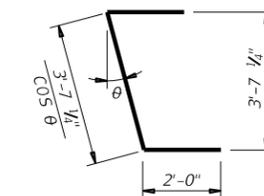
**BARS D(#6)**



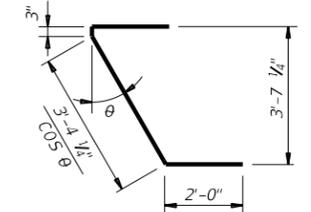
**BARS M(#4)**



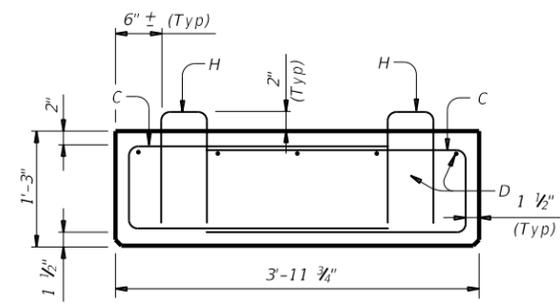
**BARS H(#4)**



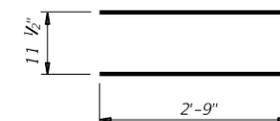
**BARS M1(#4)**



**BARS M2(#4)**



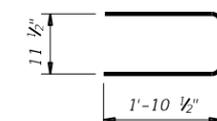
**SECTION**



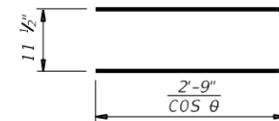
**BARS C(#4)**



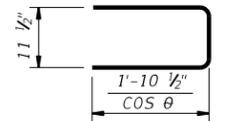
**BARS U(#5)**



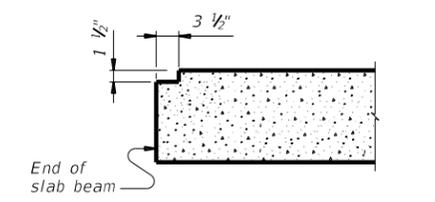
**BARS N(#4)**



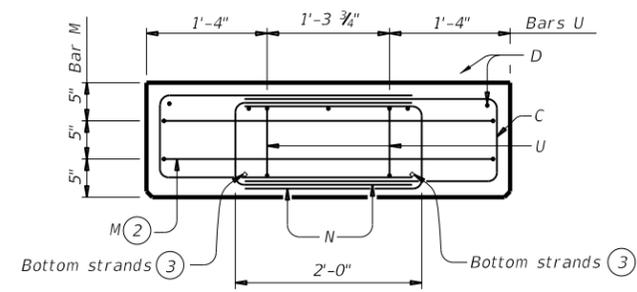
**BARS C1(#4)**



**BARS N1(#4)**



**ELEVATION OF BLOCKOUT (6)**



**END MAT REINFORCING**

Bars H not shown for clarity.

BEAM PROPERTIES		
Area	in <sup>2</sup>	716.2
Y top	in	7.50
Y bott	in	7.50
I	in <sup>4</sup>	13,429
Weight (4)	lb/ft	746

**GENERAL NOTES:**

- Designed according to AASHTO LRFD Bridge Design Specifications.
- Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.
- Provide Grade 60 reinforcing steel.
- An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.
- These details can be used for any skew angle up to a maximum of 30 degrees.
- Chamfer all exposed corners 3/4" or round to a 3/4" radius.
- Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.

- (1) See End Mat Reinforcing detail.
- (2) Adjust bars M vertically to avoid strands.
- (3) See sheet PSBND or PSBSD for strand locations.
- (4) Assumes 150 pcf weight density of concrete.
- (5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
- (6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation  
 Bridge Division Standard

**PRESTRESSED CONCRETE SLAB BEAM DETAILS**

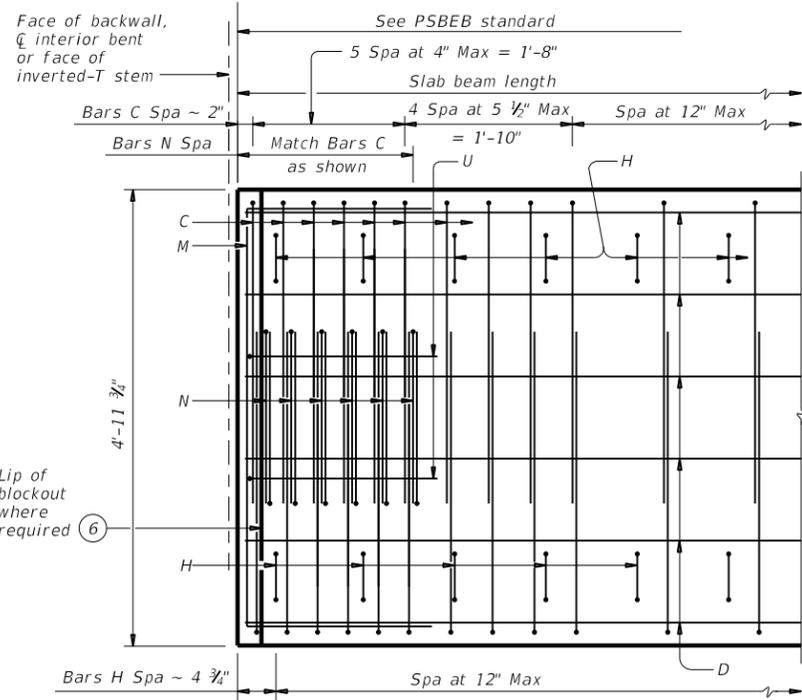
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**PSB-4SB15**

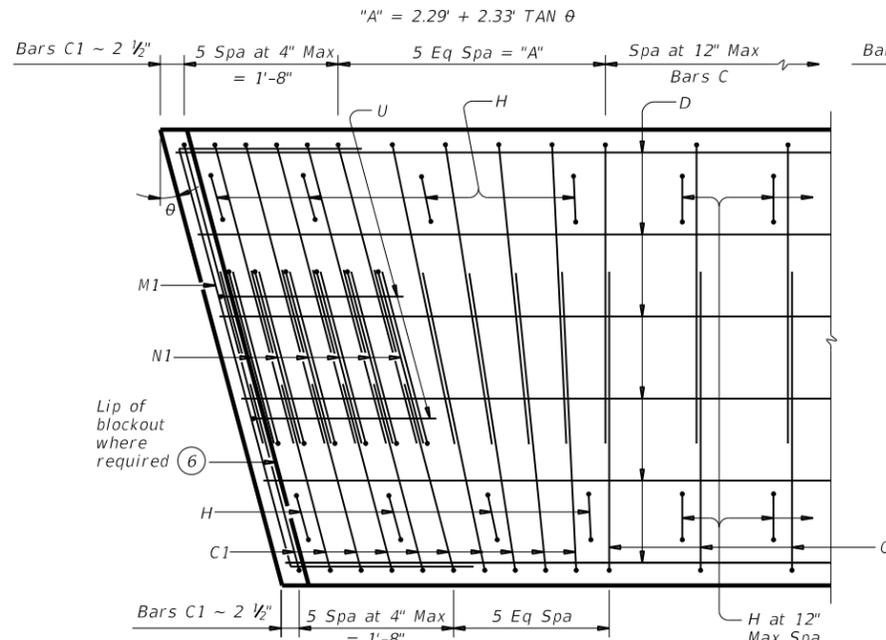
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©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		68	

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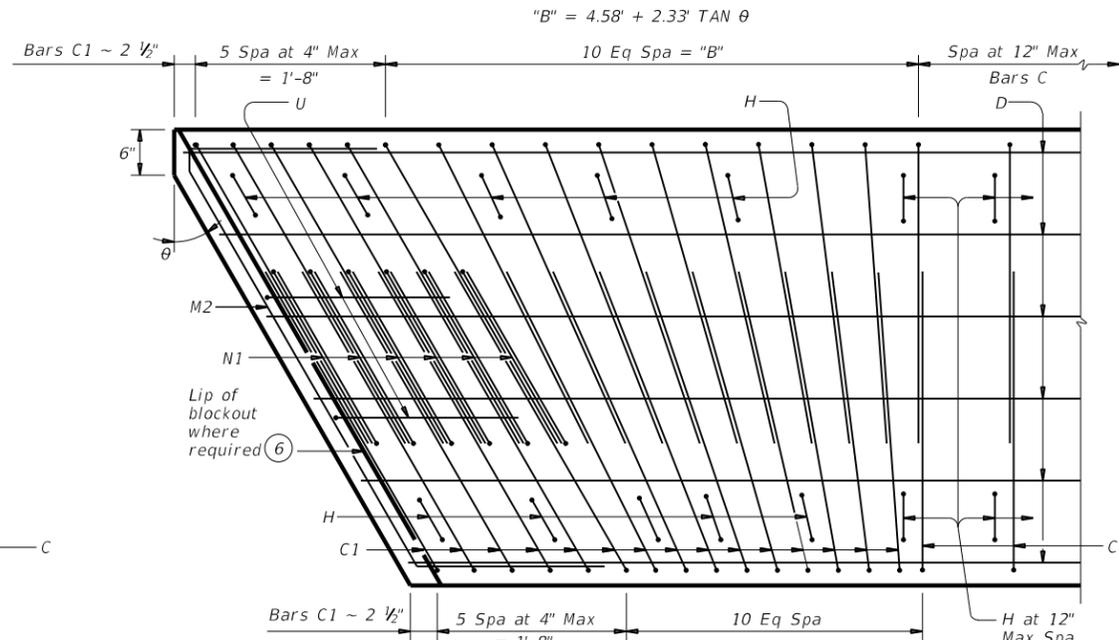
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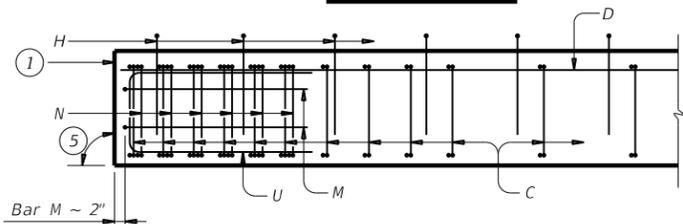
**PART PLAN**



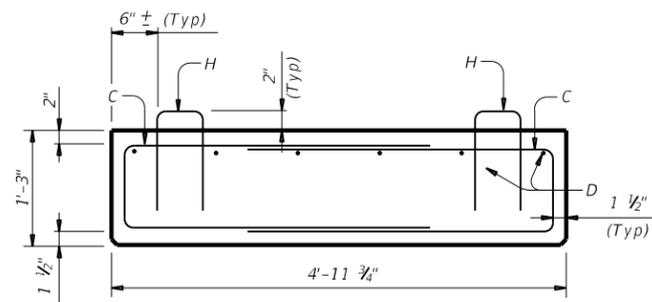
**PART SKEW PLAN**  
(Showing  $\theta$  over 0° to 15° skew)



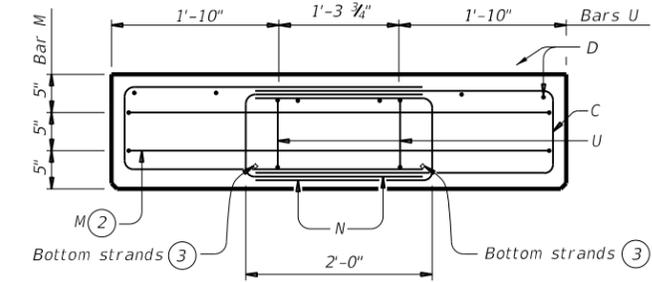
**PART SKEW PLAN**  
(Showing  $\theta$  over 15° to 30° skew)



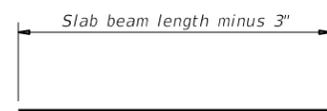
**ELEVATION**



**SECTION**



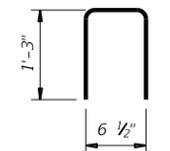
**END MAT REINFORCING**  
Bars H not shown for clarity.



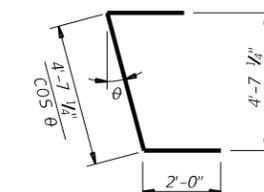
**BARS D(#6)**



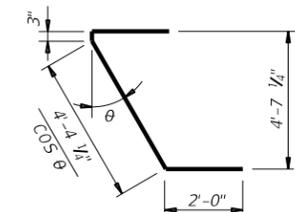
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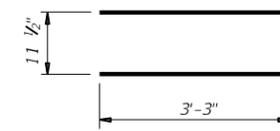
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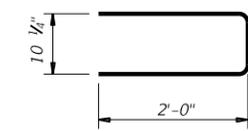
**BARS M1(#4)**



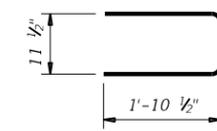
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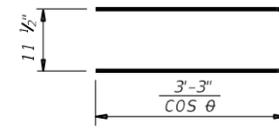
**BARS C(#4)**



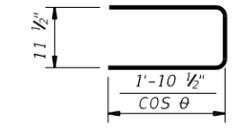
**BARS U(#5)**



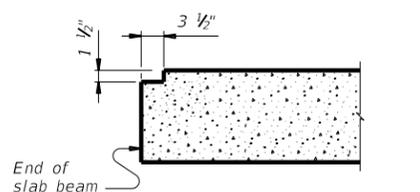
**BARS N(#4)**



**BARS C1(#4)**



**BARS N1(#4)**



**ELEVATION OF BLOCKOUT**

BEAM PROPERTIES		
Area	in <sup>2</sup>	896.2
Y top	in	7.50
Y bott	in	7.50
I	in <sup>4</sup>	16,805
Weight	lb/ft	934

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.  
 Provide Grade 60 reinforcing steel.  
 An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.  
 These details can be used for any skew angle up to a maximum of 30 degrees.  
 Chamfer all exposed corners 3/4" or round to a 3/4" radius.  
 Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.

- ① See End Mat Reinforcing detail.
- ② Adjust bars M vertically to avoid strands.
- ③ See sheet PSBND or PSBSD for strand locations.
- ④ Assumes 150 pcf weight density of concrete.
- ⑤ 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.
- ⑥ Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation  
 Bridge Division Standard

## PRESTRESSED CONCRETE SLAB BEAM DETAILS

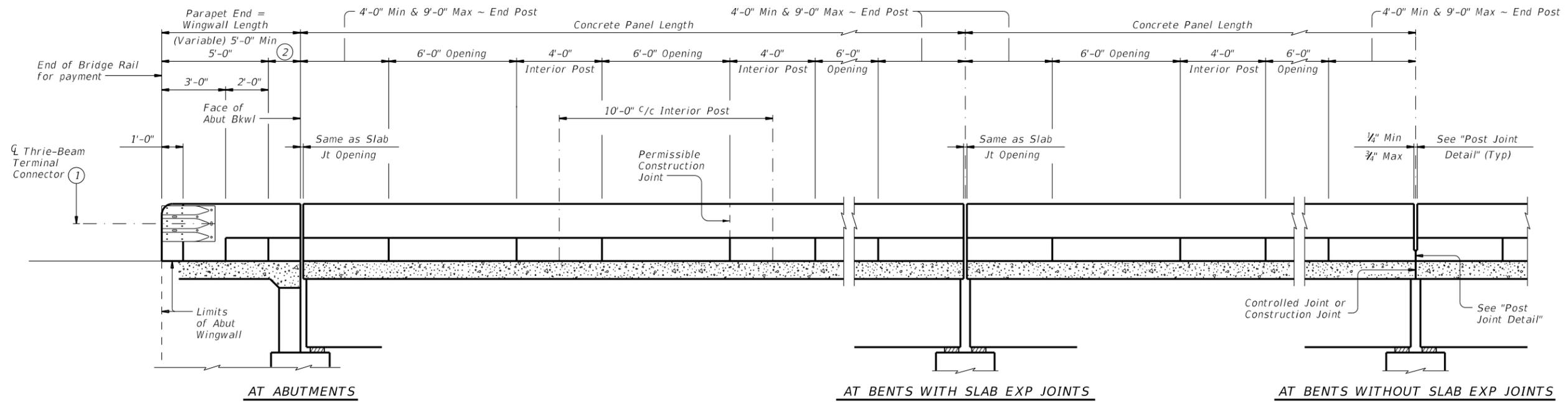
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### PSB-5SB15

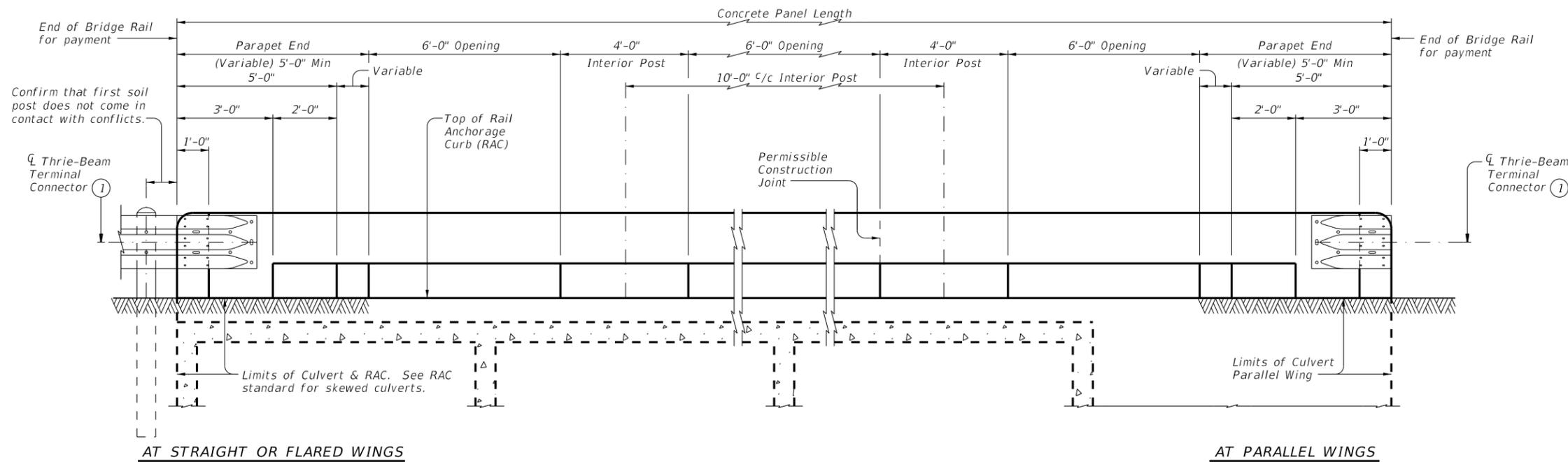
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©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		69	

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DATE: 3/6/2023 4:24:05 PM  
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**ROADWAY ELEVATION OF RAIL ON BRIDGE**



**ROADWAY ELEVATION OF RAIL ON BOX CULVERTS**

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

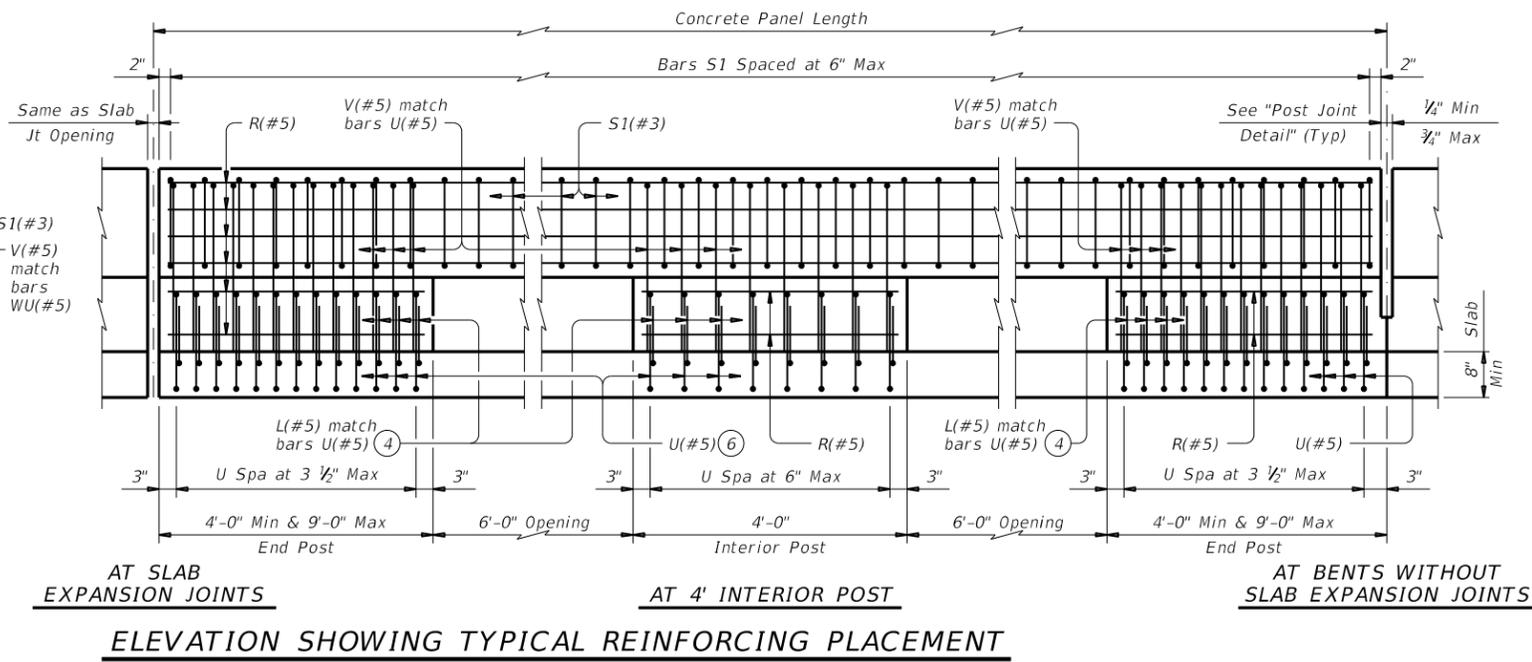
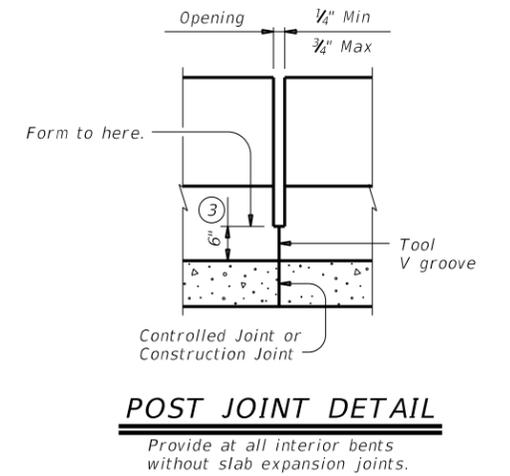
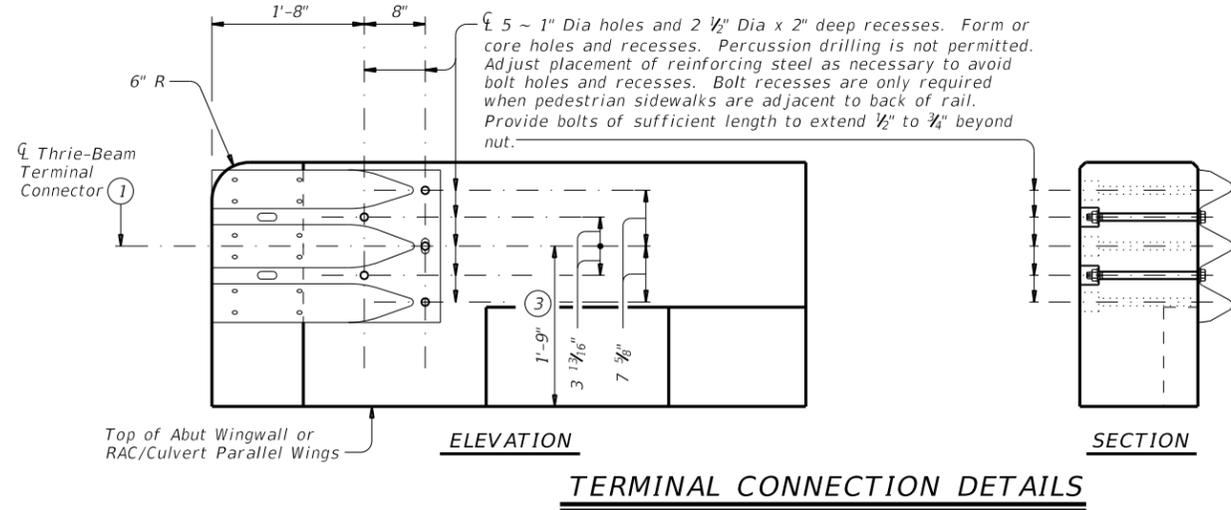
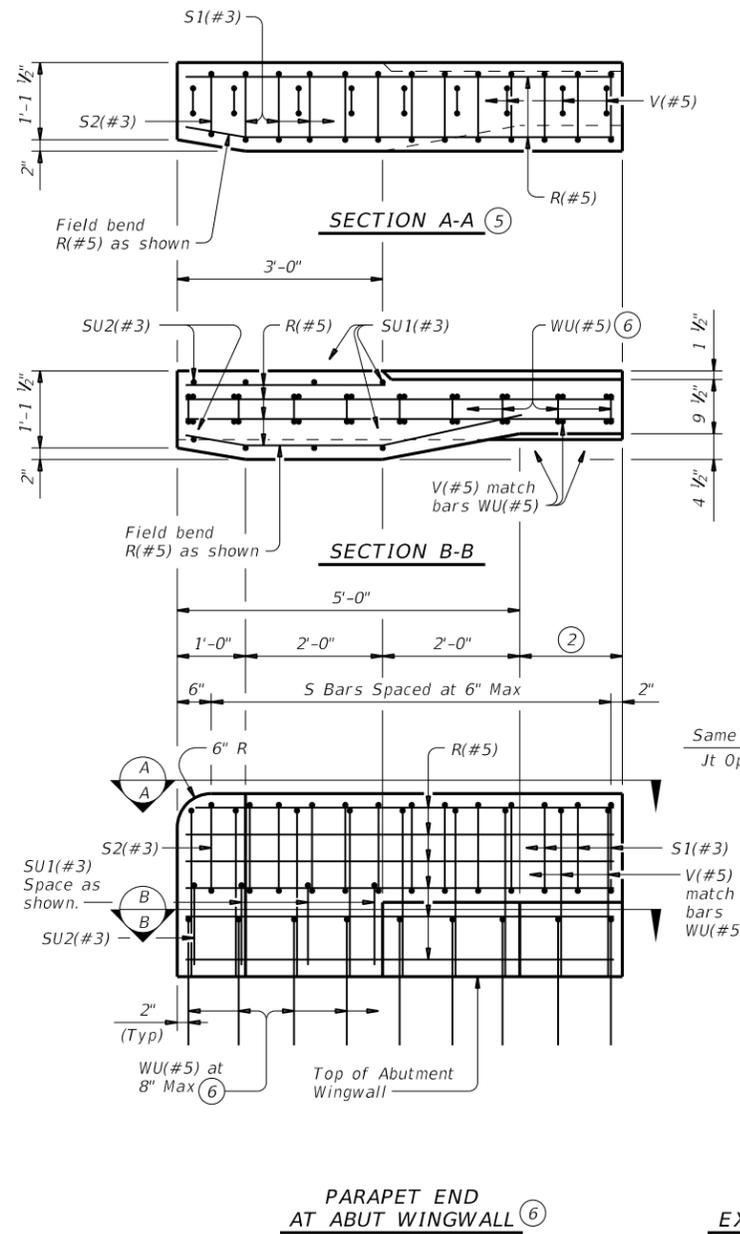
- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)

SHEET 1 OF 3

		<b>Bridge Division Standard</b>	
<h2>TRAFFIC RAIL</h2>			
<h3>TYPE T223</h3>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT: 0334	SECT: 08	JOB: 037
REVISIONS			HIGHWAY: FM 154
	DIST: YKM	COUNTY: FAYETTE	SHEET NO.: 70

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DATE: 3/6/2023 4:24:08 PM  
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Showing rail on slab. Rail on box culvert similar.

- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

SHEET 2 OF 3



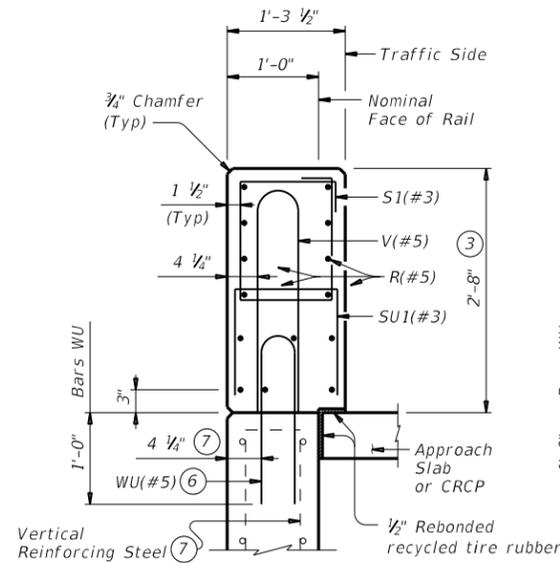
**TRAFFIC RAIL**

**TYPE T223**

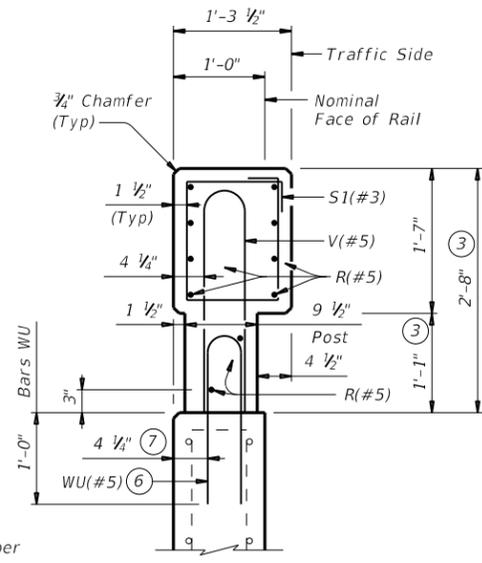
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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		71	

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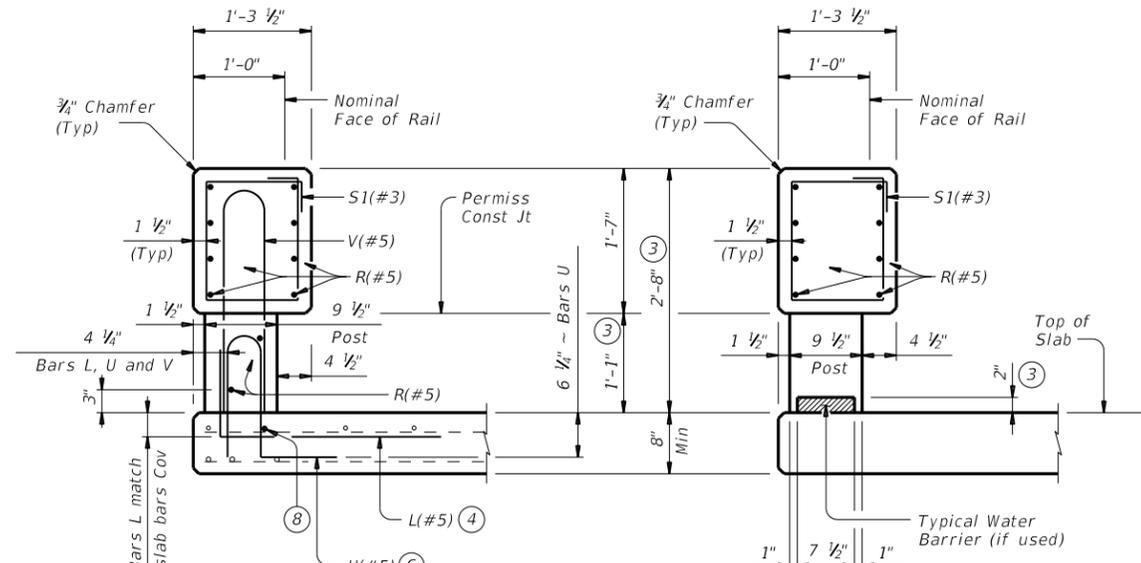
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SECTION C-C  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS

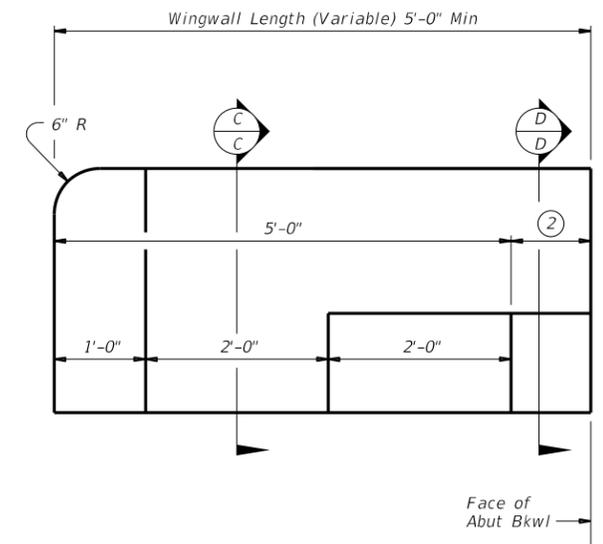


SECTION D-D  
ON ABUTMENT WINGWALLS  
OR CIP RETAINING WALLS



AT POST  
ON BRIDGE SLAB

AT OPENING  
ON BRIDGE SLAB



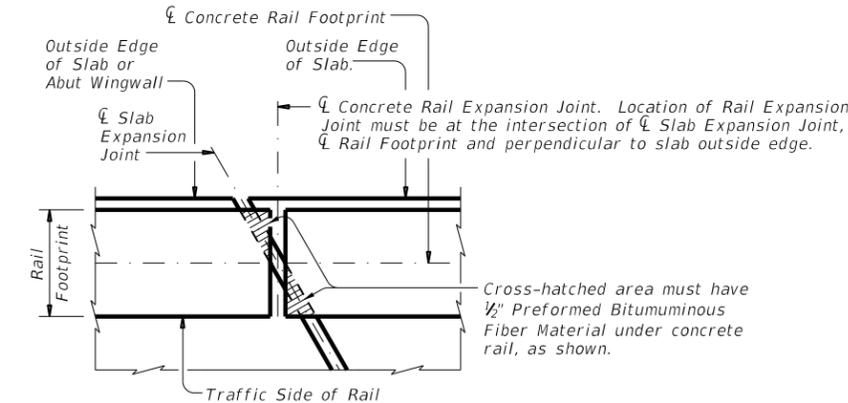
ELEVATION AT  
ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

**SECTIONS THRU RAIL**

Sections on box culverts similar.

- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑦ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.
- ⑧ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑨ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway surface without overlay.



**PLAN OF RAIL AT EXPANSION JOINTS**

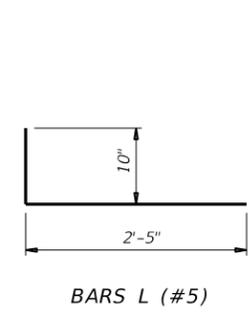
Example showing Slab Expansion Joints without breakbacks.

**CONSTRUCTION NOTES:**  
 Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.  
 Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.  
 Chamfer all exposed corners.

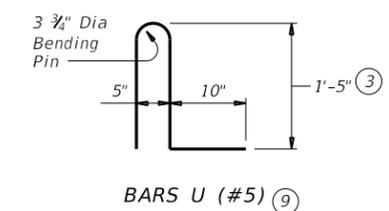
**MATERIAL NOTES:**  
 Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.  
 Provide Grade 60 reinforcing steel.  
 Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.  
 Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.  
 Provide bar laps, where required, as follows:  
 Uncoated or galvanized ~ #5 = 2'-0"  
 Epoxy coated ~ #5 = 3'-0"

**GENERAL NOTES:**  
 This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can be used for speeds of 45 mph and less.  
 Do not use this railing on bridges with expansion joints providing more than 5" movement.  
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.  
 Shop drawings are not required for this rail.  
 Average weight of railing with no overlay is 358 plf.

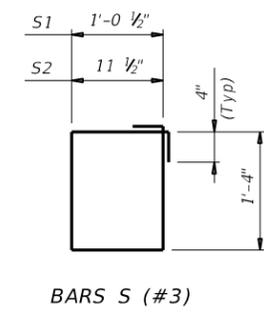
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



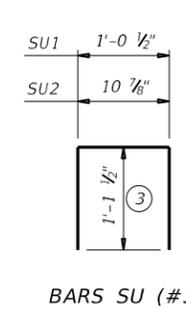
BARS L (#5)



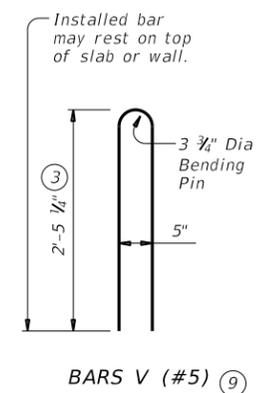
BARS U (#5) ⑨



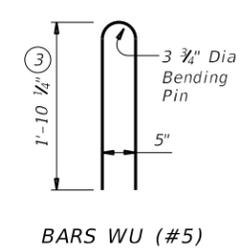
BARS S (#3)



BARS SU (#3)



BARS V (#5) ⑨



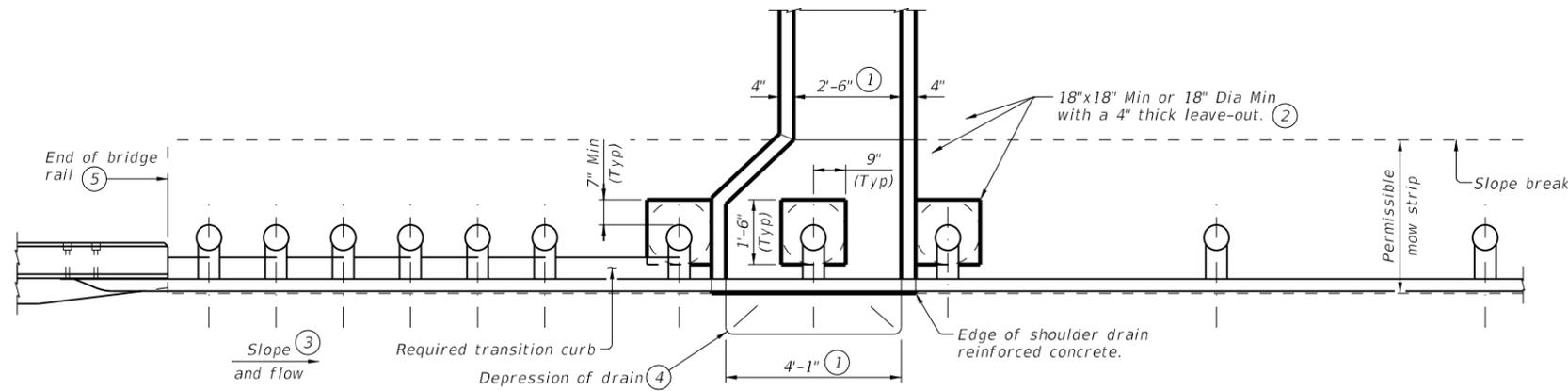
BARS WU (#5)

SHEET 3 OF 3

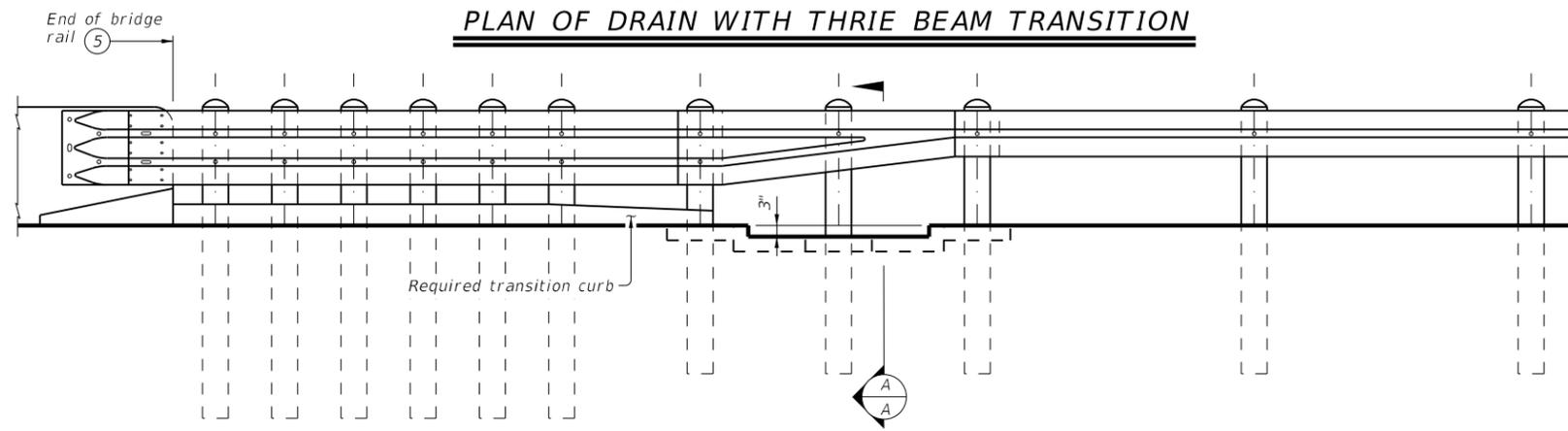
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<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
©TxDOT September 2019	CONT: 0334	SECT: 08	JOB: 037
REVISIONS			FM 154
DIST: YKM	COUNTY: FAYETTE	SHEET NO. 72	

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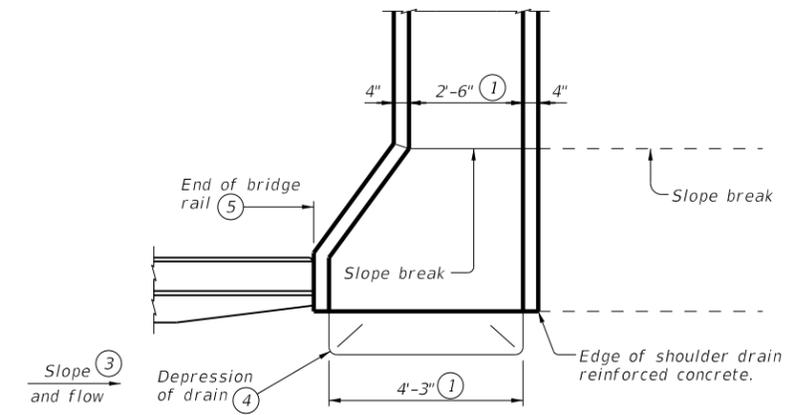
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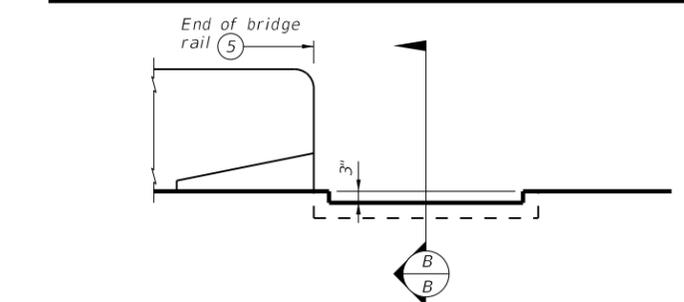
**PLAN OF DRAIN WITH THRIE BEAM TRANSITION**



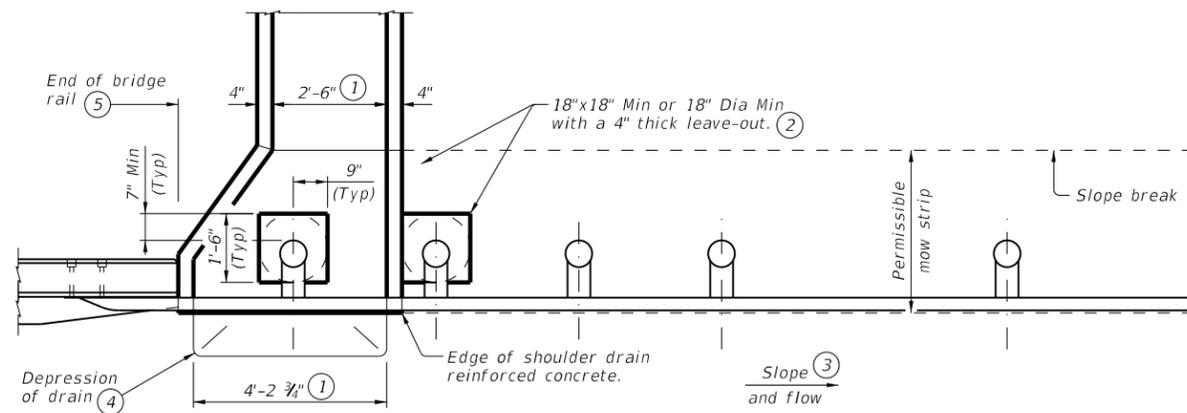
**ROADWAY ELEVATION OF DRAIN WITH THRIE BEAM TRANSITION**



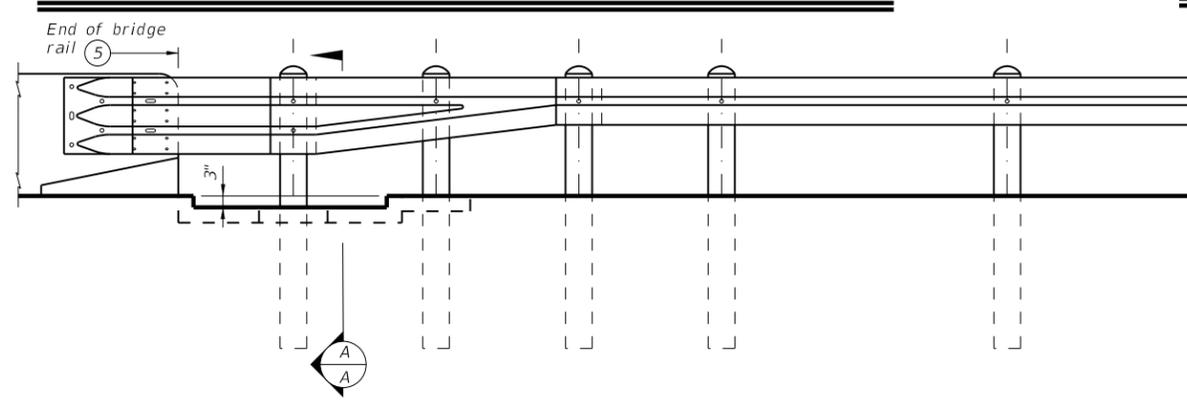
**PLAN OF DRAIN WITHOUT MBEF TRANSITION**



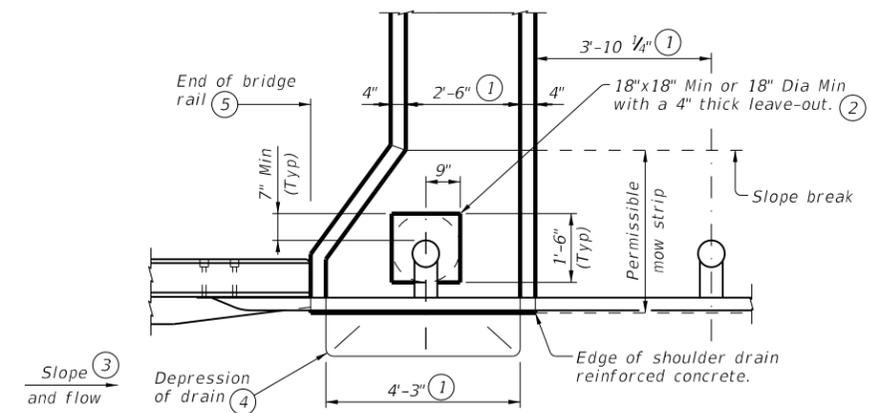
**ROADWAY ELEVATION OF DRAIN WITHOUT MBEF TRANSITION**



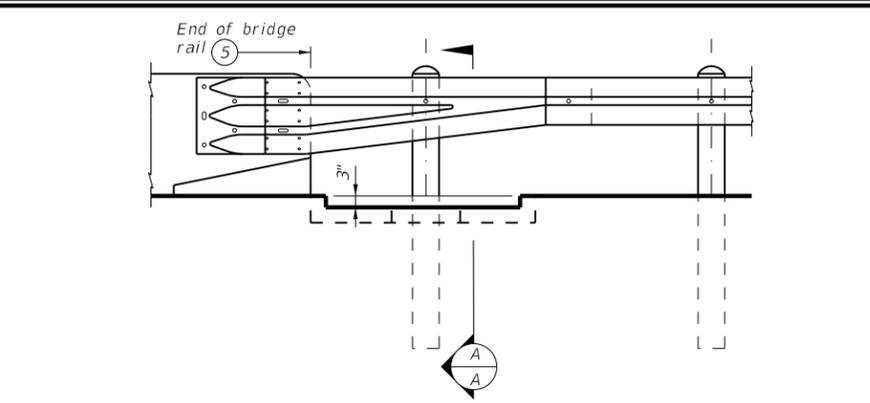
**PLAN OF DRAIN WITH TL-2 (LOW SPEED) TRANSITION**



**ROADWAY ELEVATION OF DRAIN WITH TL-2 (LOW SPEED) TRANSITION**



**PLAN OF DRAIN WITH DOWNSTREAM ANCHOR TERMINAL**



**ROADWAY ELEVATION OF DRAIN WITH DOWNSTREAM ANCHOR TERMINAL**

- ① Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer. Location of shoulder drain must consider limitation imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- ② Fill leave-outs with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (20" Max leave-out).
- ③ For other slope and flow directions drain configuration may be mirrored wider or tapered wider if shown elsewhere in the plans or directed by the Engineer.
- ④ Form depression into concrete, asphalt pavement, or approach slab.
- ⑤ See Bridge Layout for rail type.

SHEET 1 OF 2



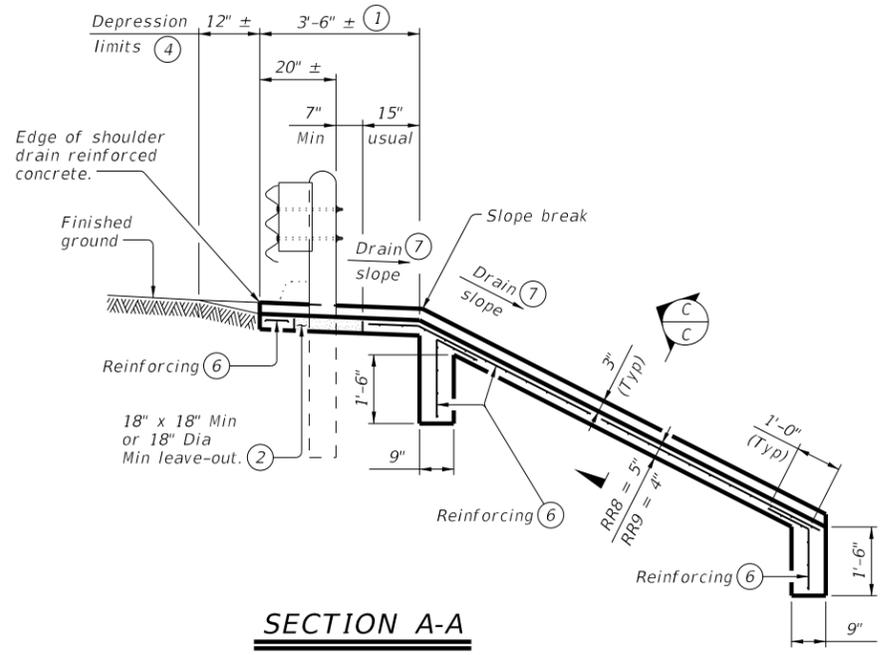
**SHOULDER DRAIN AT END OF BRIDGE RAIL**

SD-EBR

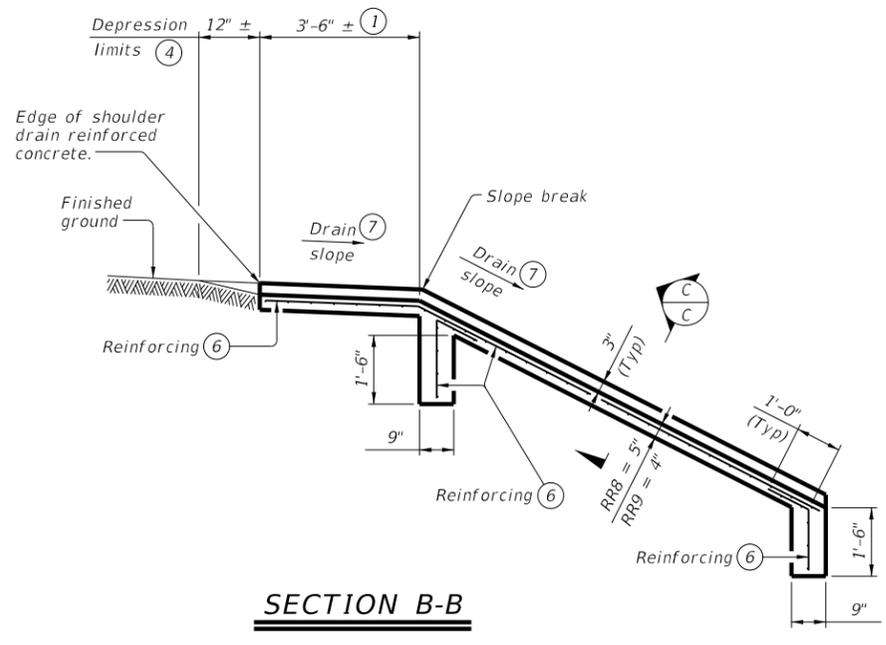
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		73	

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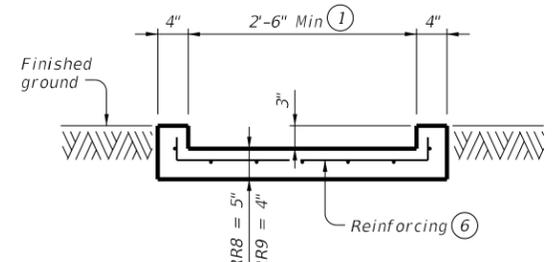
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**SECTION A-A**

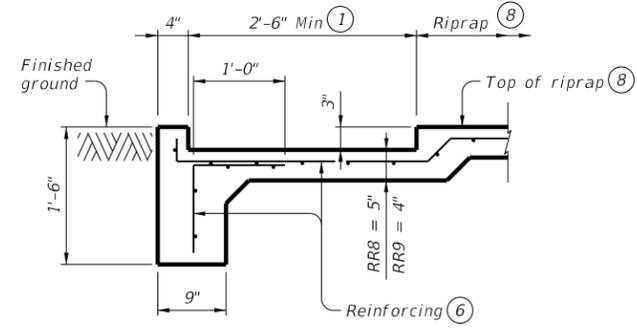


**SECTION B-B**



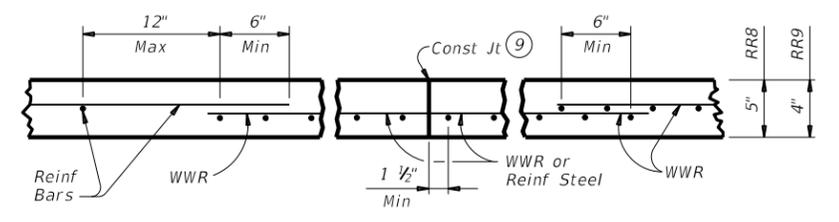
**SECTION C-C**

Sections shown without integrated riprap.



**SECTION C-C**

Sections shown with integrated riprap.



**REINFORCEMENT DETAILS**

See General Notes for optional synthetic fiber reinforcement.

- ① Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer. Location of shoulder drain must consider limitation imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
- ② Fill leave-outs with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (20" Max leave-out).
- ④ Form depression into concrete, asphalt pavement, or approach slab.
- ⑥ Provide (#3) reinforcing bar at 18" spacing c-c or welded wire reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars, unless shown otherwise.
- ⑦ See elsewhere in plans or as directed by the Engineer.
- ⑧ See CRR standard for details and notes not shown.
- ⑨ WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic fiber is utilized.

**GENERAL NOTES:**

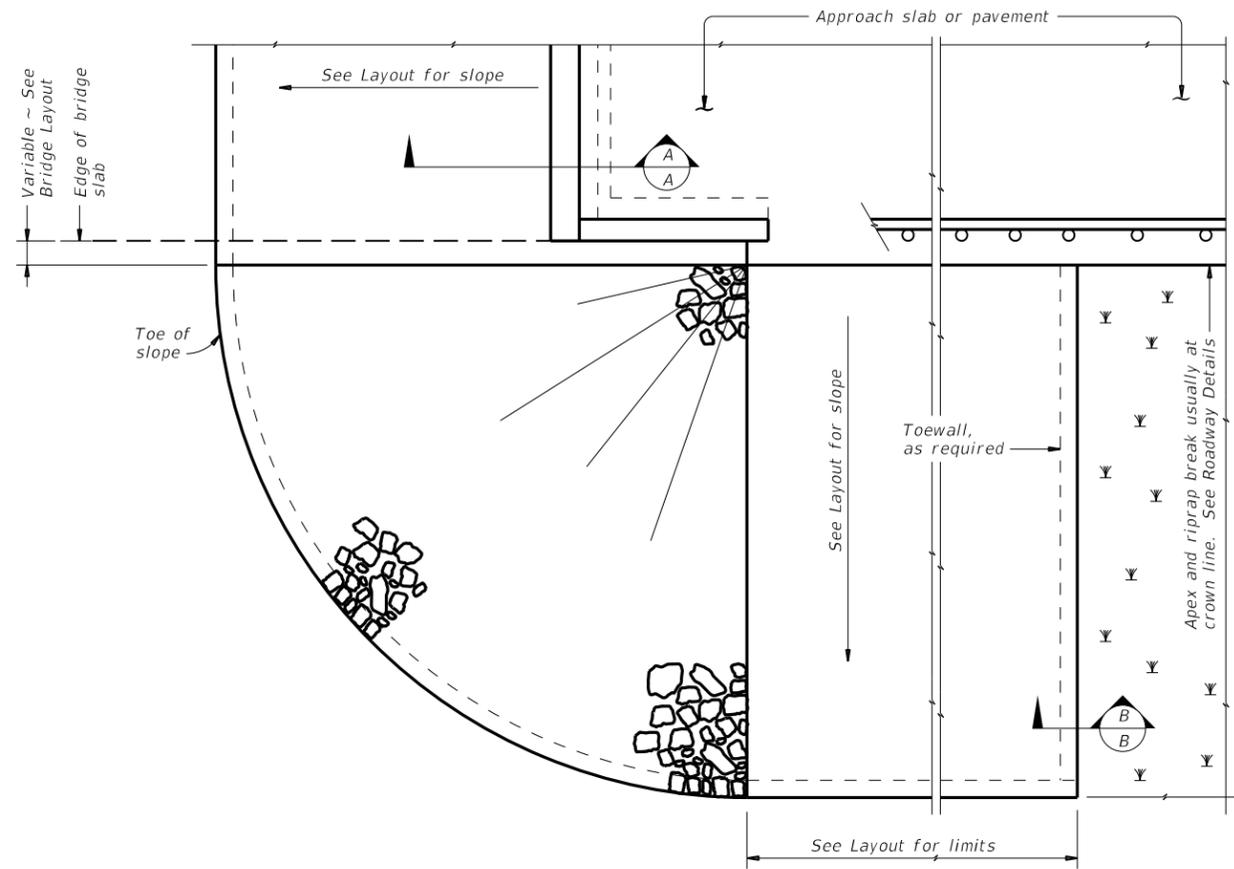
Provide Class "B" concrete with a minimum compressive strength of 2,000 psi unless noted elsewhere in plans.  
 Provide Grade 60 reinforcing steel.  
 Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.  
 Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.  
 Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.  
 See Metal Beam Guard Fence (Mow Strip) standard for details and notes not shown.  
 Payment for furnishing and placing 2-sack grout mixture will be subsidiary to shoulder drain.  
 Payment for shoulder drain will be as per Item 420, "CI B Conc (Flume)". All details shown herein are subsidiary to shoulder drain. See Layout for limits of shoulder drain.  
 RR8 is to be used on stream crossings.  
 RR9 is to be used on other embankments.

SHEET 2 OF 2

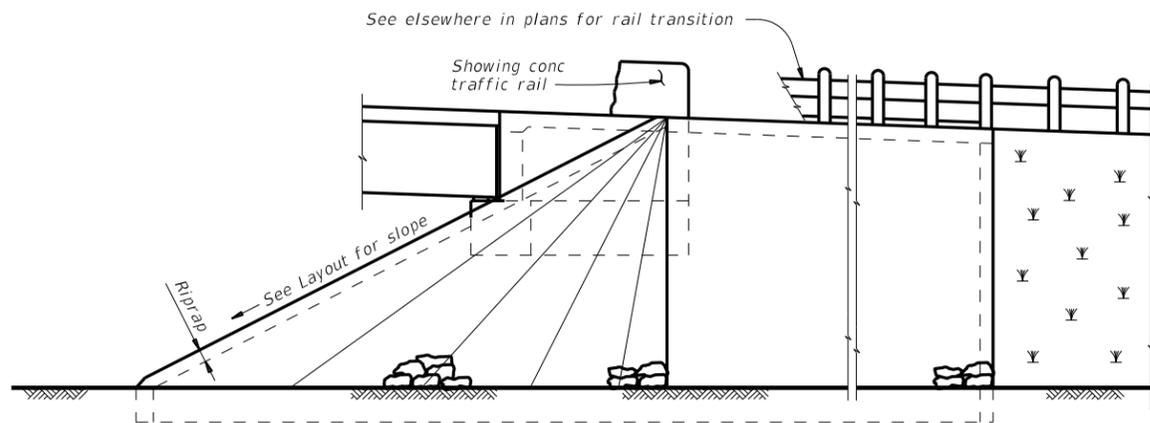
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<h3>SD-EBR</h3>			
FILE: sdebr001-19.dgn	DN: TxDOT	CK: TAR	DW: JTR
©TxDOT April 2019	CONT: 0334	SECT: 08	JOB: 037
REVISIONS	0334	08	037
DIST: YKM	COUNTY: FAYETTE	SHEET NO. 74	

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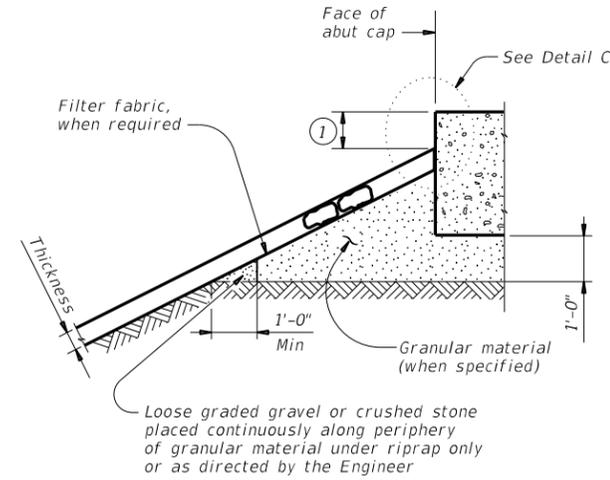
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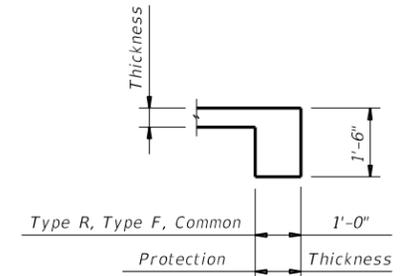
**PLAN**



**ELEVATION**



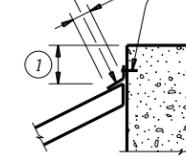
**SECTION A-A AT CAP**



**SECTION B-B**

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

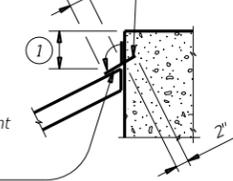
8"X 18 Gage galvanized flashing full length of cap



**CAP OPTION A**

Nail flashing to cap or wingwall and seal with joint sealer

8"X 18 Gage galvanized flashing full length of cap



**CAP OPTION B**

**DETAIL C**

① Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

**GENERAL NOTES:**

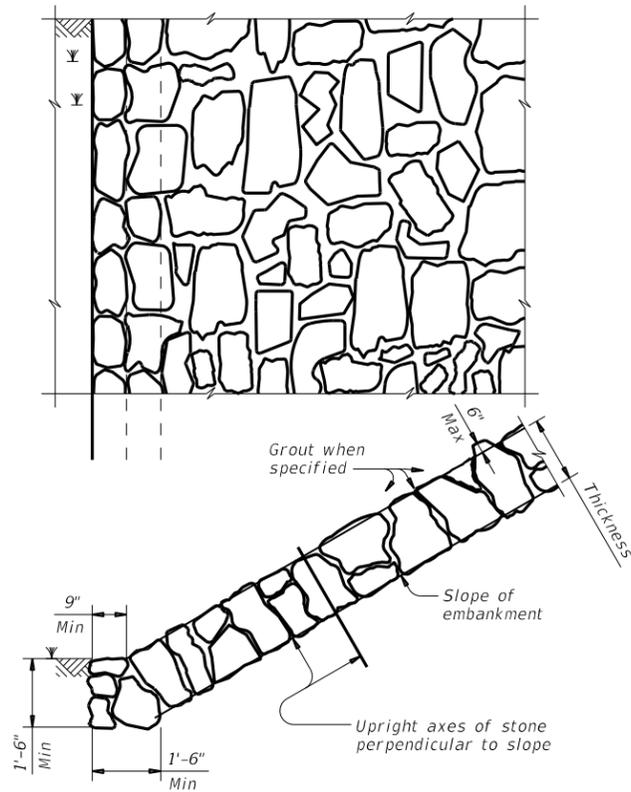
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.  
 See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

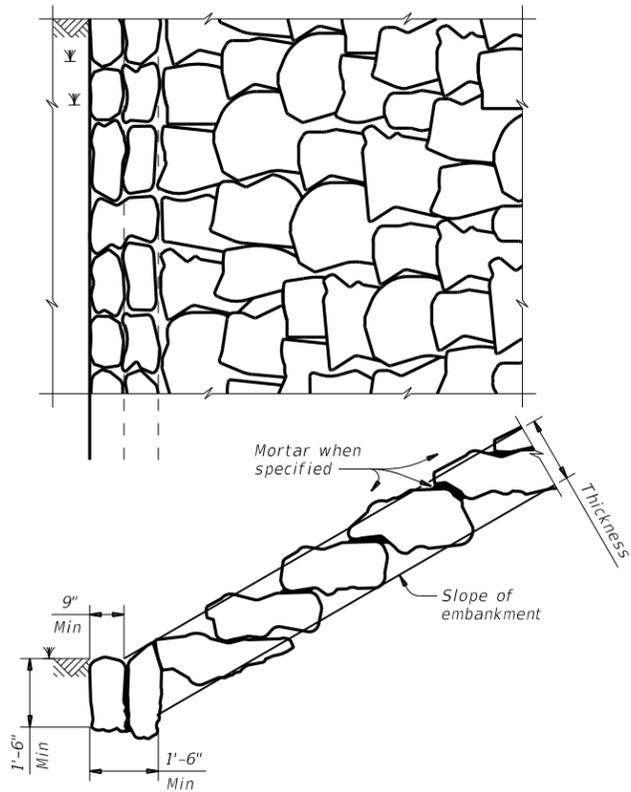
					Bridge Division Standard
<h2>STONE RIPRAP</h2>					
<h3>SRR</h3>					
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0334	08	037	FM 154	
	DIST	COUNTY	SHEET NO.		
	YKM	FAYETTE	75		

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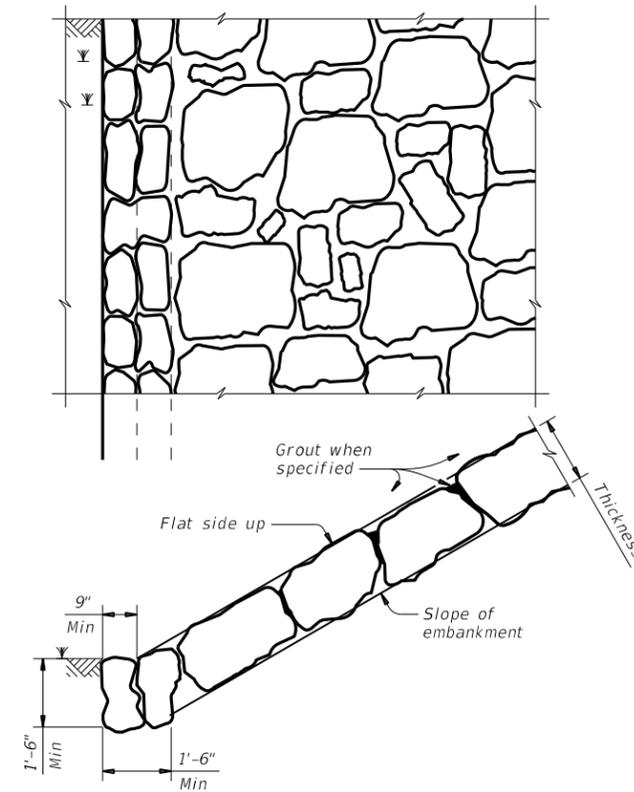
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**FIGURE 1 ~ TYPE R STONE RIPRAP**  
dry or grouted

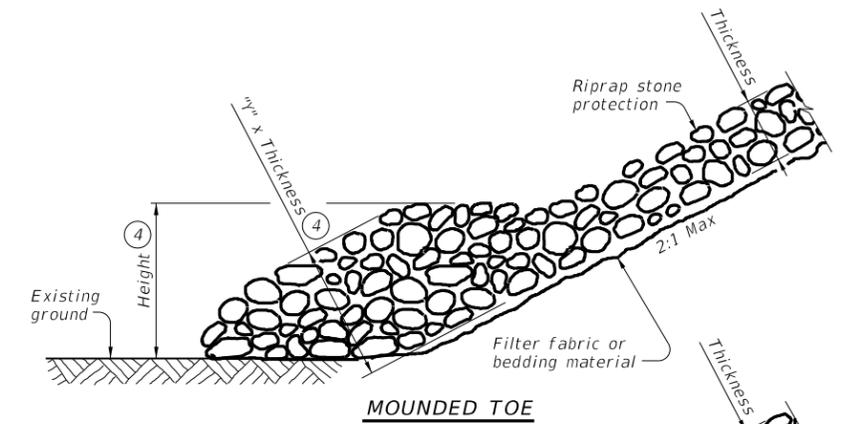


**FIGURE 2 ~ TYPE F STONE RIPRAP**  
dry or mortared

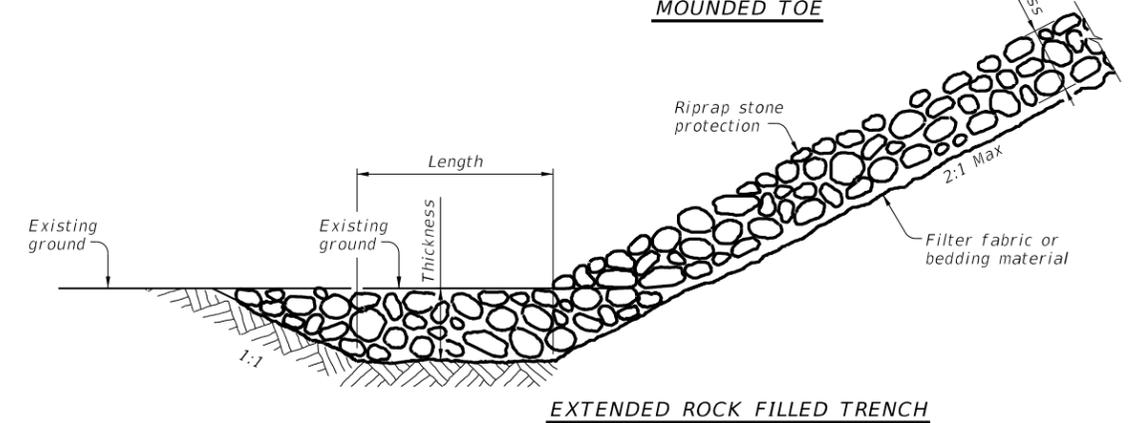


**FIGURE 3 ~ TYPE F STONE RIPRAP**  
grouted

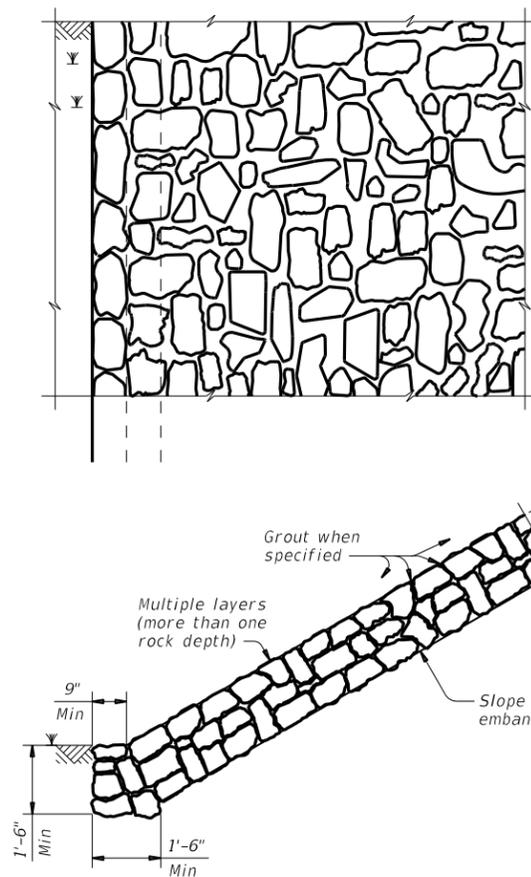
- ② Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.
- ③ Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.
- ④ "y" and Height need to be defined. See layout or detail sheet for values if this option is used.
- ⑤ List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.  
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



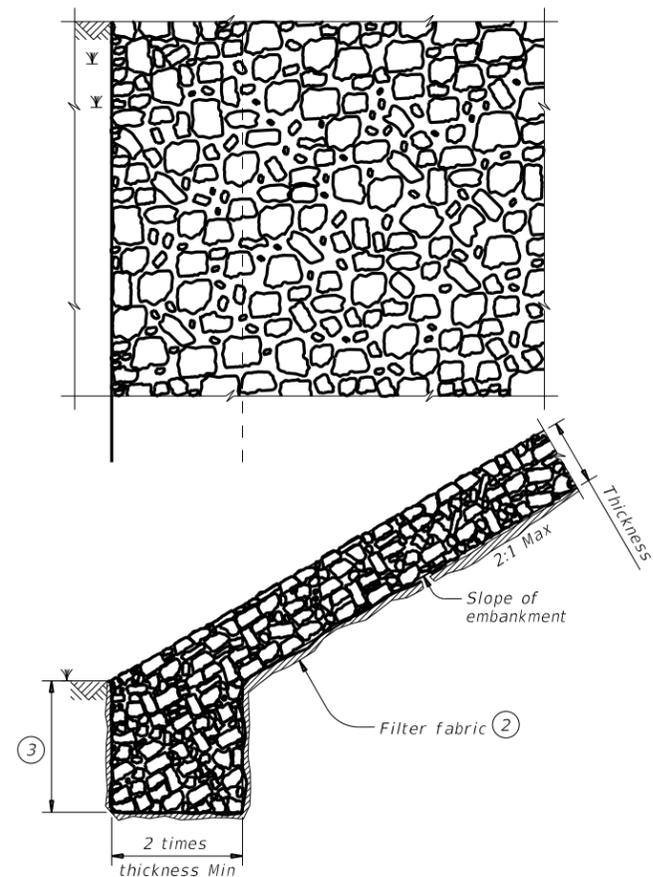
**MOUNDED TOE**



**EXTENDED ROCK FILLED TRENCH**  
**PROTECTION STONE RIPRAP TOE OPTIONS ⑤**



**FIGURE 4 ~ COMMON STONE RIPRAP**  
dry or grouted



**FIGURE 5 ~ PROTECTION STONE RIPRAP ⑤**

SHEET 2 OF 2



**STONE RIPRAP**

**SRR**

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0334	08	037	FM 154
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	76	

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DATE: 3/6/2023 4:24:33 PM  
 FILE: c:\pwworking\kha\pwworking\new\_user (1)\d0240593.dgn -20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE	DOUBLE	INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX (XX) NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRFL = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount DIRECTION If Required BI = Bi-Directional BR = Bi-Directional with red on back	INSTL OM ASSM (OM-XX) (XXXX)XXX (XX) TYPE OF OBJECT MARKER 1, 2, 3, or 4 NUMBER OF REFLECTORS OR DIRECTION X = 3-Size 2 reflector unit (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) TYPE OF POST WC = Wing Channel Post WFLX = White Flexible Post TWT = Thin Walled Tubing TYPE OF MOUNT GND = Embedded (drivable) SRF = Surface Mount WAS = Wedge Anchor Steel WAP = Wedge Anchor Plastic DIRECTION If Required BI = Bi-Directional
SHEETING: Yellow, White or Red Type B or C reflective sheeting				SHEETING: Yellow, White or Red Type B or C Reflective Sheeting					
NOTE: 1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (fix). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				SHEETING: Yellow, White or Red Type B or C Reflective Sheeting					
				POST TYPE: WC, YFLX, WFLX, WC, YFLX, WFLX					
				MOUNT TYPE: GND, GND, SRF, GND, SRF					

OBJECT MARKERS								
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
	SHEETING: Yellow-Type B or C Sheeting			SHEETING: Yellow - Type B or C Sheeting			SHEETING: Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting	
	POST TYPE: TWT	POST TYPE: WC	POST TYPE: WC	POST TYPE: WFLX	POST TYPE: TWT			POST TYPE: TWT
	MOUNT TYPE: WAS, WAP	MOUNT TYPE: GND	MOUNT TYPE: GND	MOUNT TYPE: GND, SRF	MOUNT TYPE: WAS, WAP			MOUNT TYPE: WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.
DEVICE	GF1	GF2	CTB	DEVICE				W1-8	
SHEETING: Yellow, White, Red			SHEETING: Yellow, White, Red				SHEETING: Yellow, White, Red		
NOTE: 1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			NOTE: 1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).				NOTE: 1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).		
SIZE (W x L): 18" x 24" (Conventional), 24" x 30" (Conventional Oversize), 30" x 36" (Expressway), 36" x 48" (Freeway)			SIZE (W x L): 18" x 24" (Conventional), 24" x 30" (Conventional Oversize), 30" x 36" (Expressway), 36" x 48" (Freeway)				SIZE (W x L): 48" x 24" (Conventional), 60" x 30" (Expressway & Freeway)		
MOUNTING HEIGHT: 4'-0" or 7'-0"			MOUNTING HEIGHT: 4'-0" or 7'-0"				MOUNTING HEIGHT: 7'-0"		

Texas Department of Transportation  
 Traffic Safety Division Standard

### DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

## D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT: 0334	SECT: 08	JOB: 037	HIGHWAY: FM 154
10-09 3-15	DIST: YKM	COUNTY: FAYETTE	SHEET NO. 77	
4-10 7-20				

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DATE: 3/6/2023 4:24:36 PM  
 FILE: c:\pwworking\kha\pwworking\new\_user (1)\d0240593\d02-20.dgn

**POST TYPE AND SUPPORT FOUNDATION DETAILS**

**TYPE OF BARRIER MOUNTS**

**WING CHANNEL (WC)**

**FLEXIBLE POSTS (YFLX, WFLX)**

**WEDGE ANCHOR SYSTEMS**

**GUARD FENCE ATTACHMENT**

**GND**

**GND**

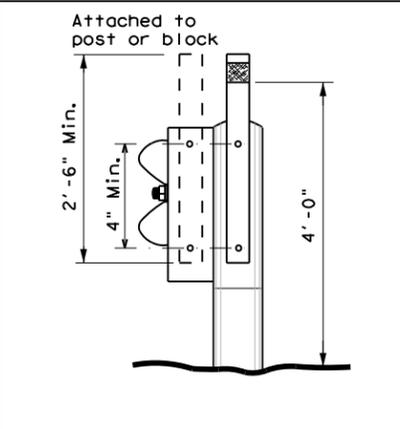
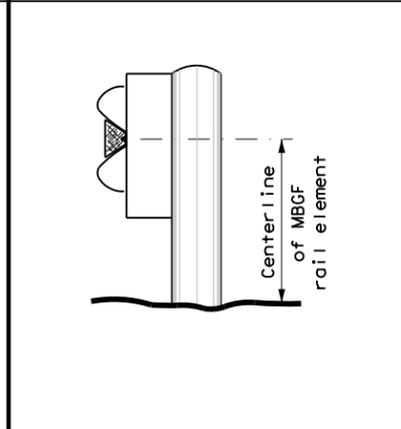
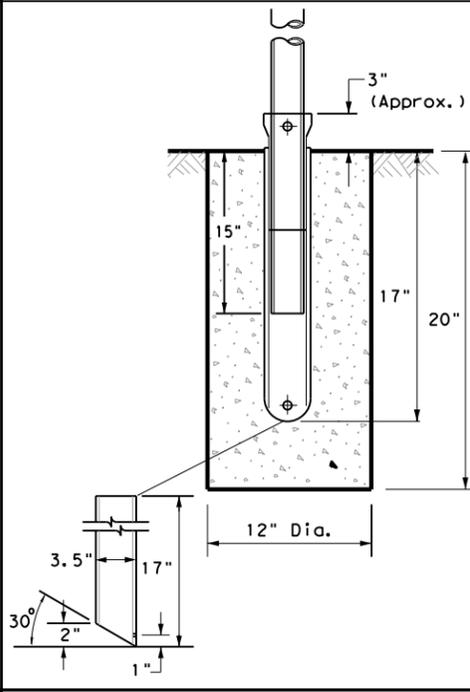
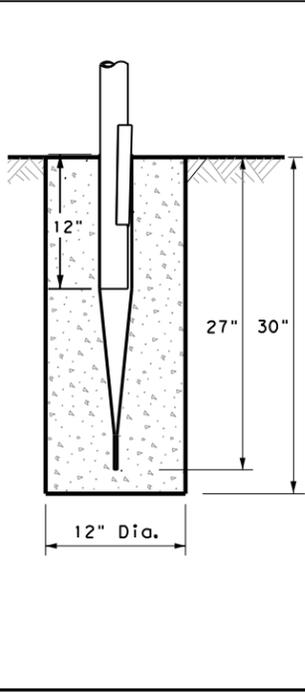
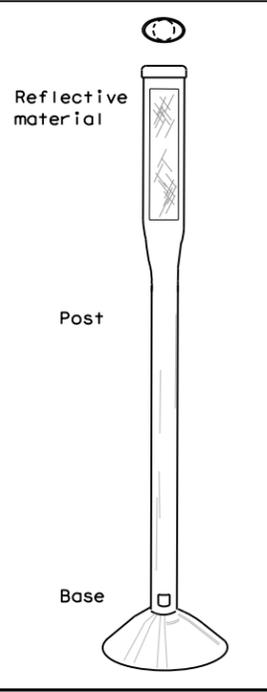
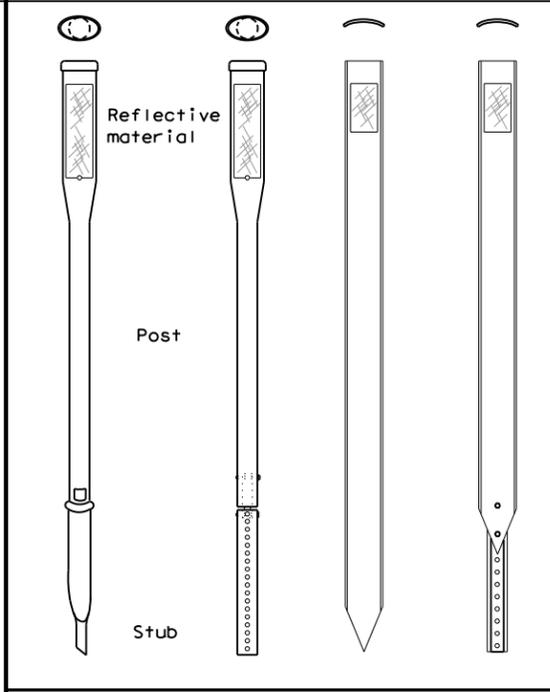
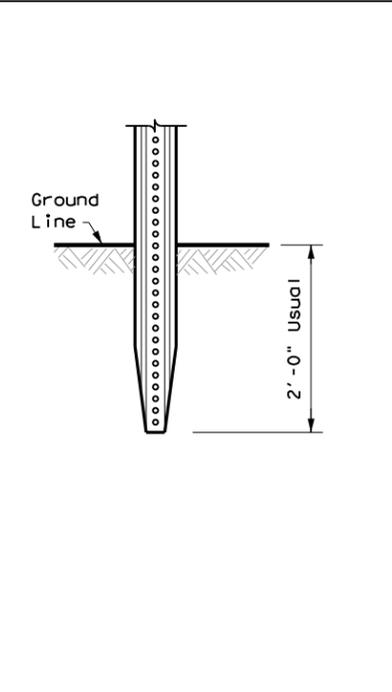
**SRF**

**WAS**

**WAP**

**GF 1**

**GF 2**



**NOTES**

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

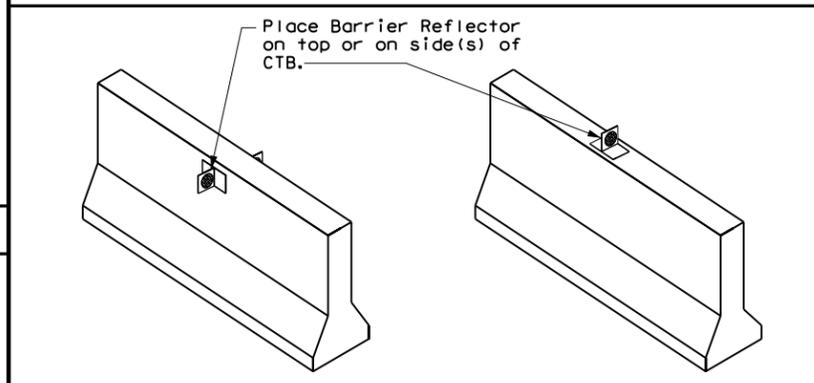
**NOTES**

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

**NOTE**

1. Install per manufacturer's recommendations.

**CONCRETE TRAFFIC BARRIER (CTB)**



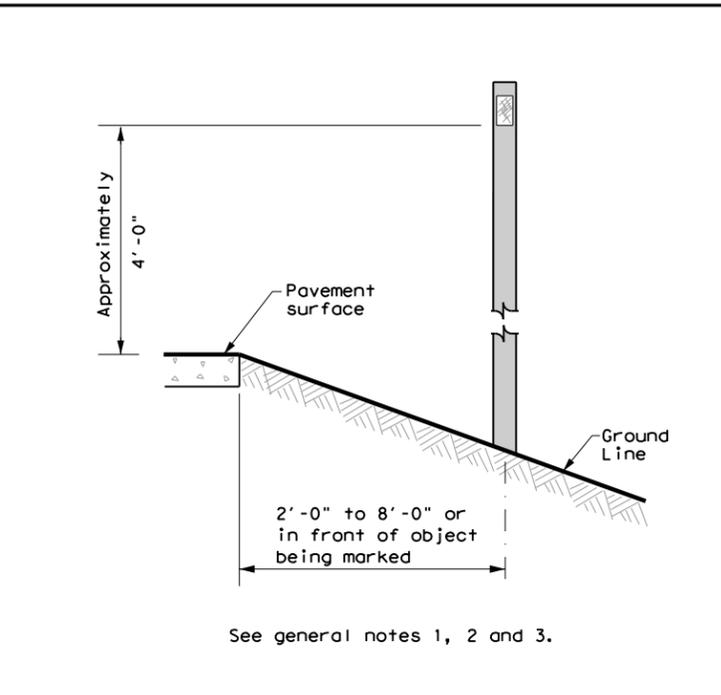
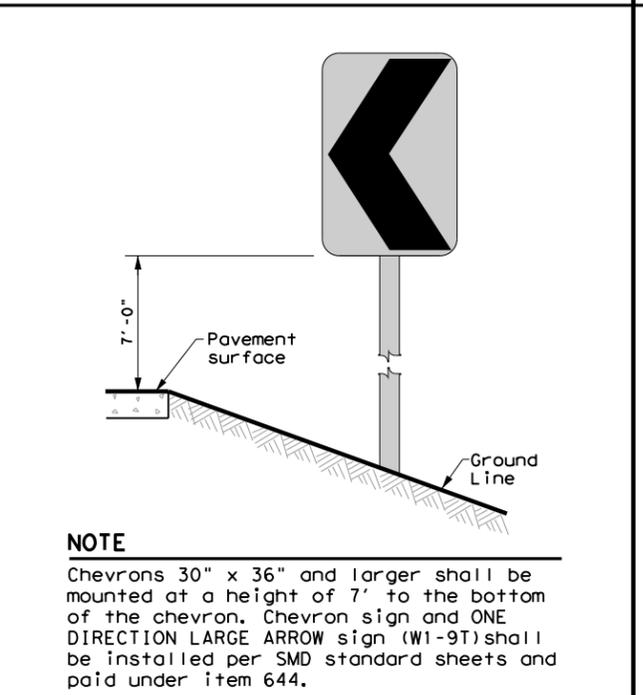
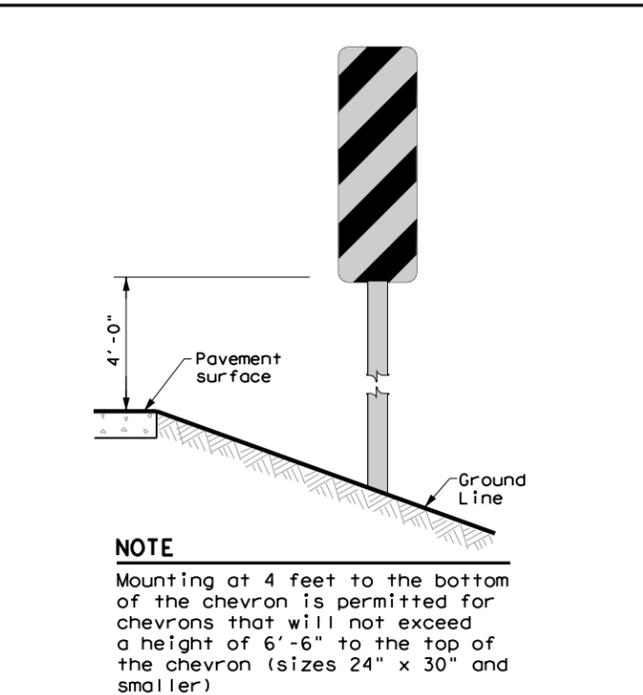
**GENERAL NOTES**

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

**TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS**

**CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN**

**DELINEATORS AND TYPE 2 OBJECT MARKERS**



Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	FAYETTE		78

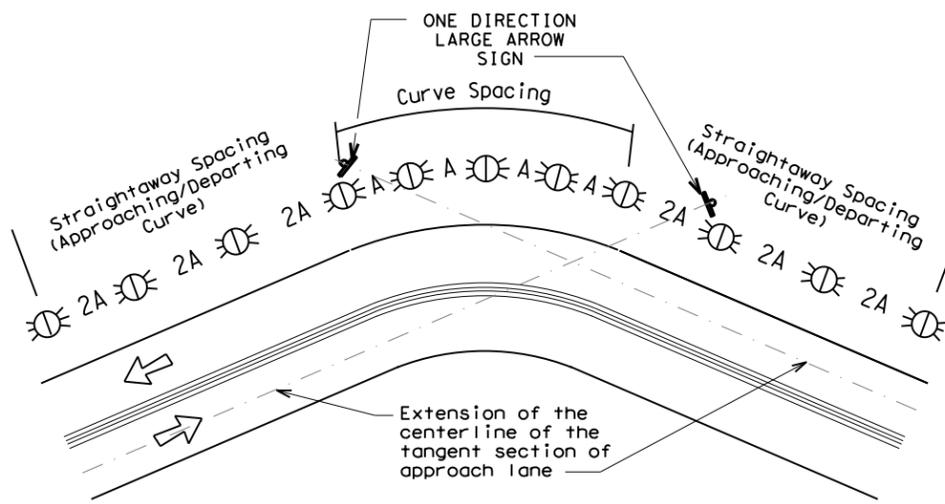
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DATE: 3/6/2023 4:24:40 PM  
 FILE: c:\pwworking\kna\pwwp\od\new\_user (1)\d0240593\d0m3-20.dgn

### MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

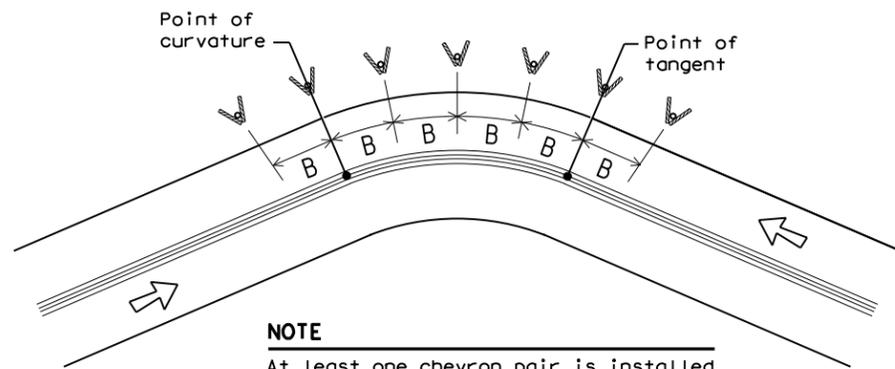
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**NOTE**

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

### SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



**NOTE**

At least one chevron pair is installed beyond the point of tangent in tangent section.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

### DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

### DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

**NOTES**

- Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
- Barrier reflectors may be used to replace required delineators.
- Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Traffic Safety Division Standard

## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

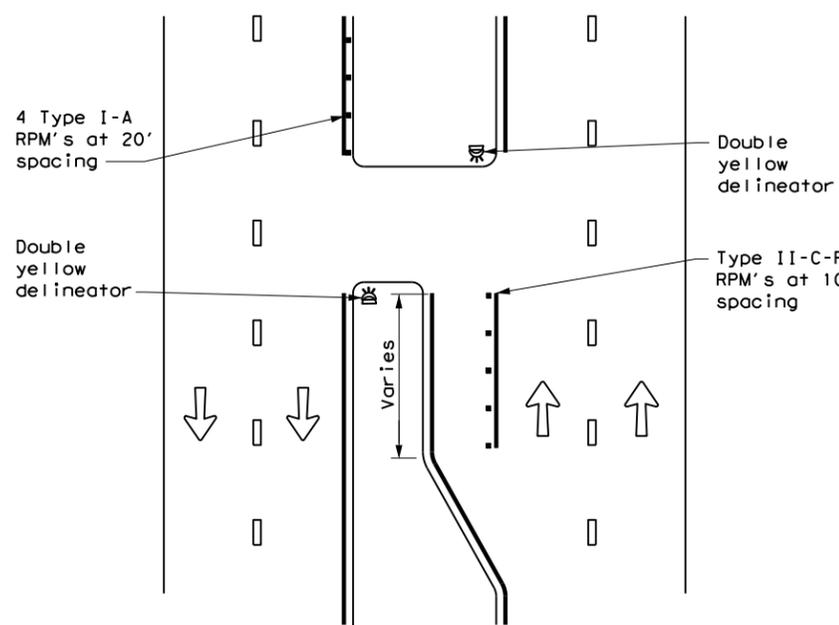
### D & OM(3)-20

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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	YKM	FAYETTE	79	

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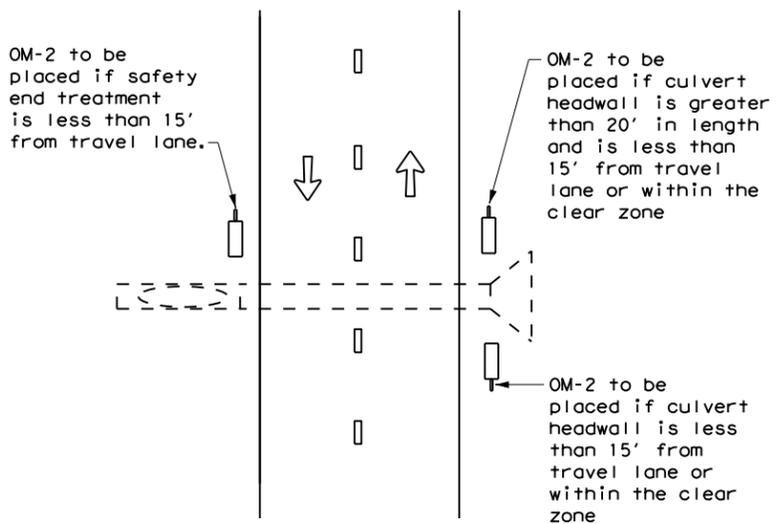
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**CROSSOVERS**



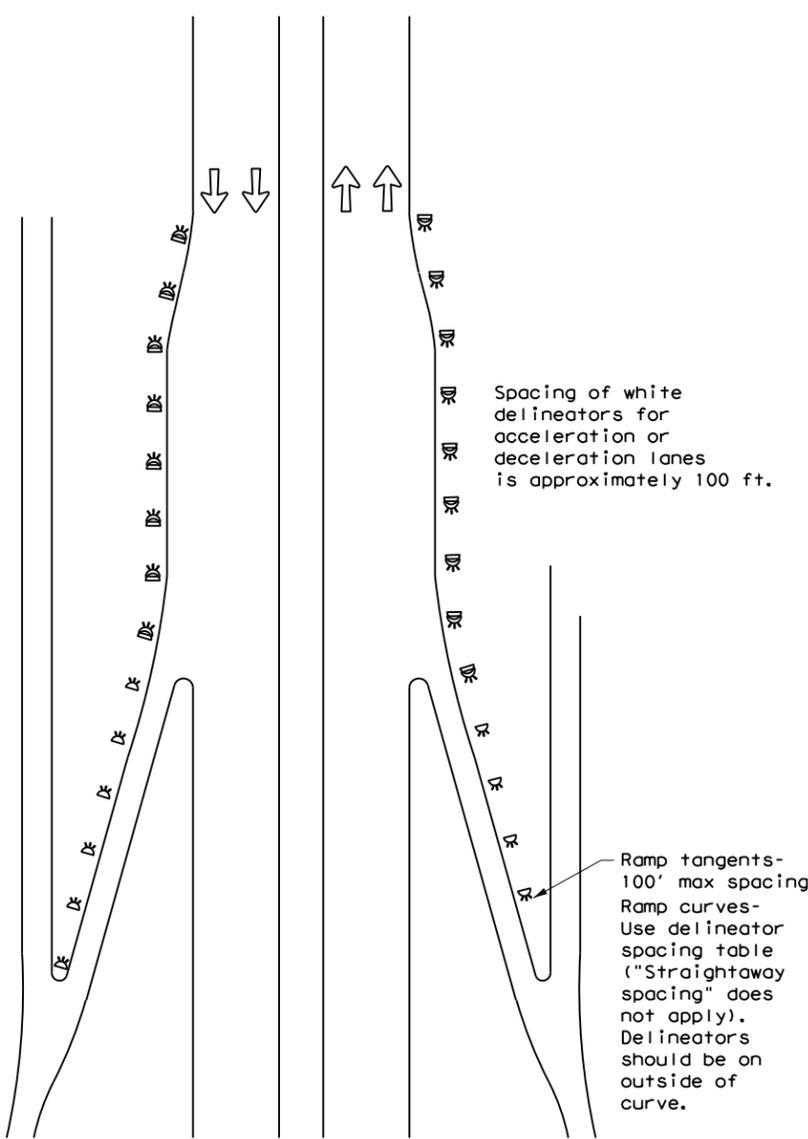
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



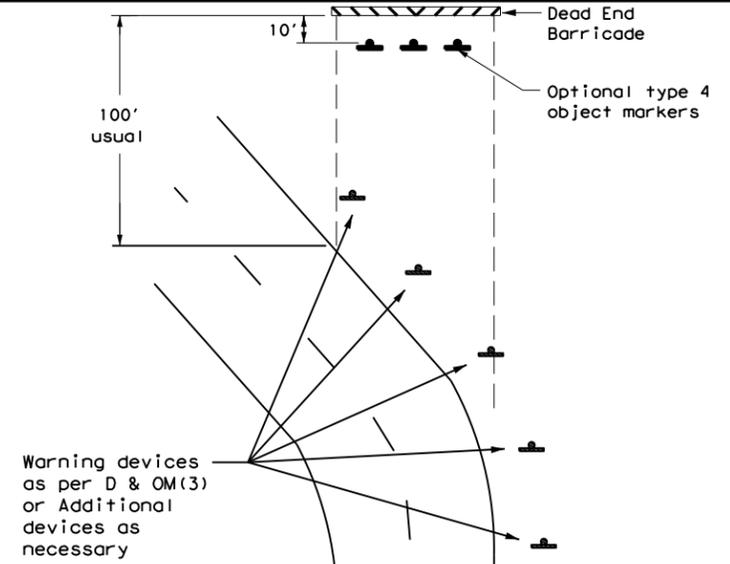
**DETAIL 2**

**FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES**



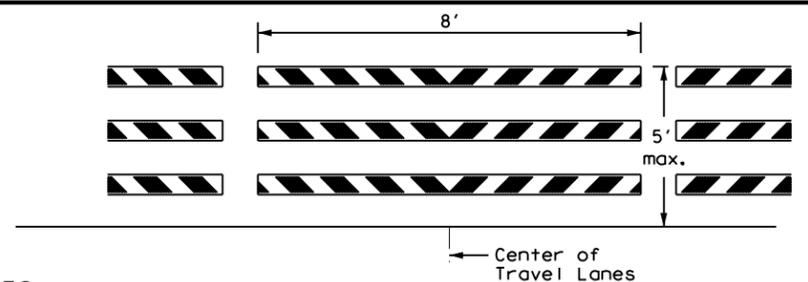
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

**DETAIL 5**

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

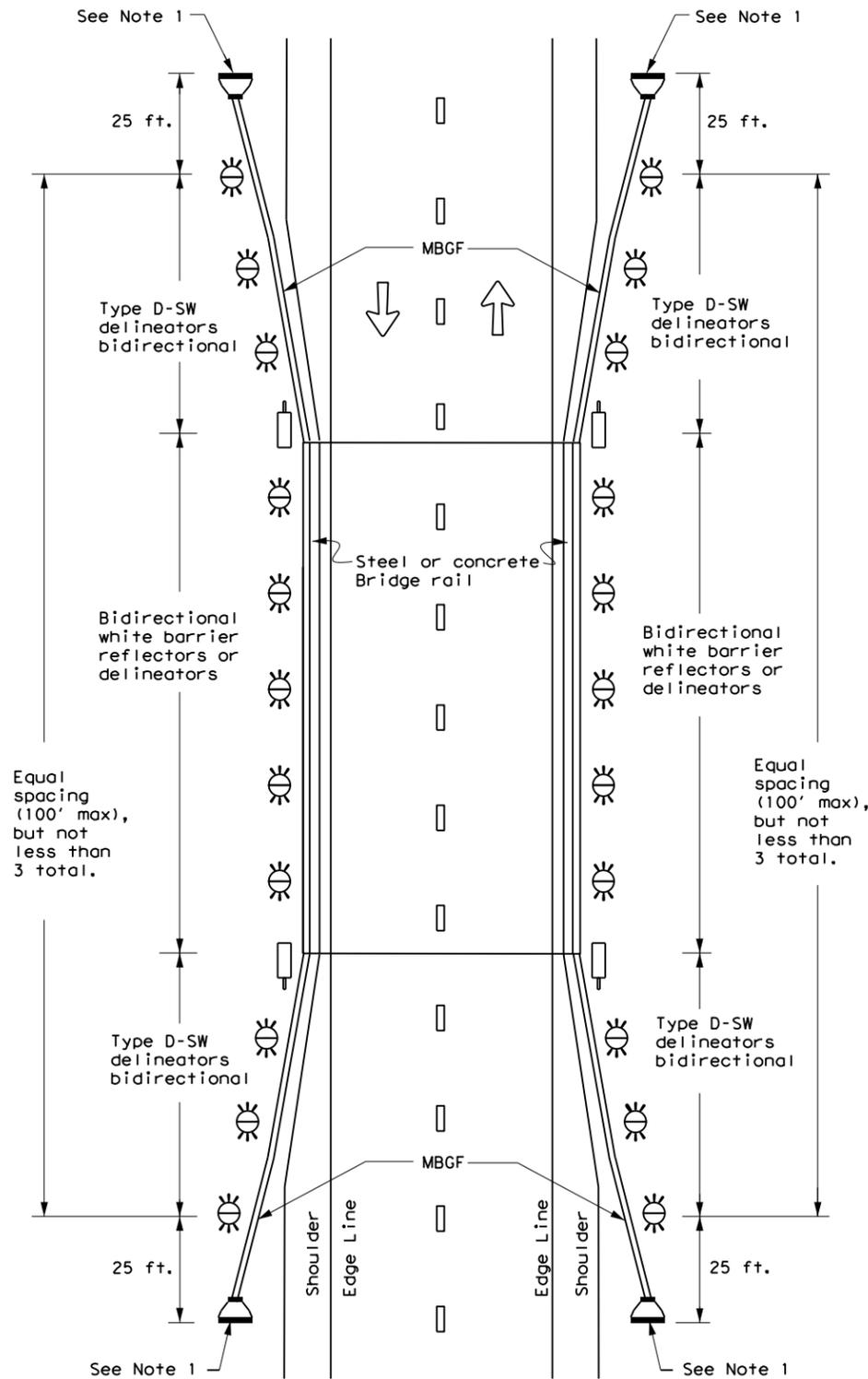


**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

**D & OM(4) -20**

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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
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3-15	DIST	COUNTY	SHEET NO.	
7-20	YKM	FAYETTE	80	

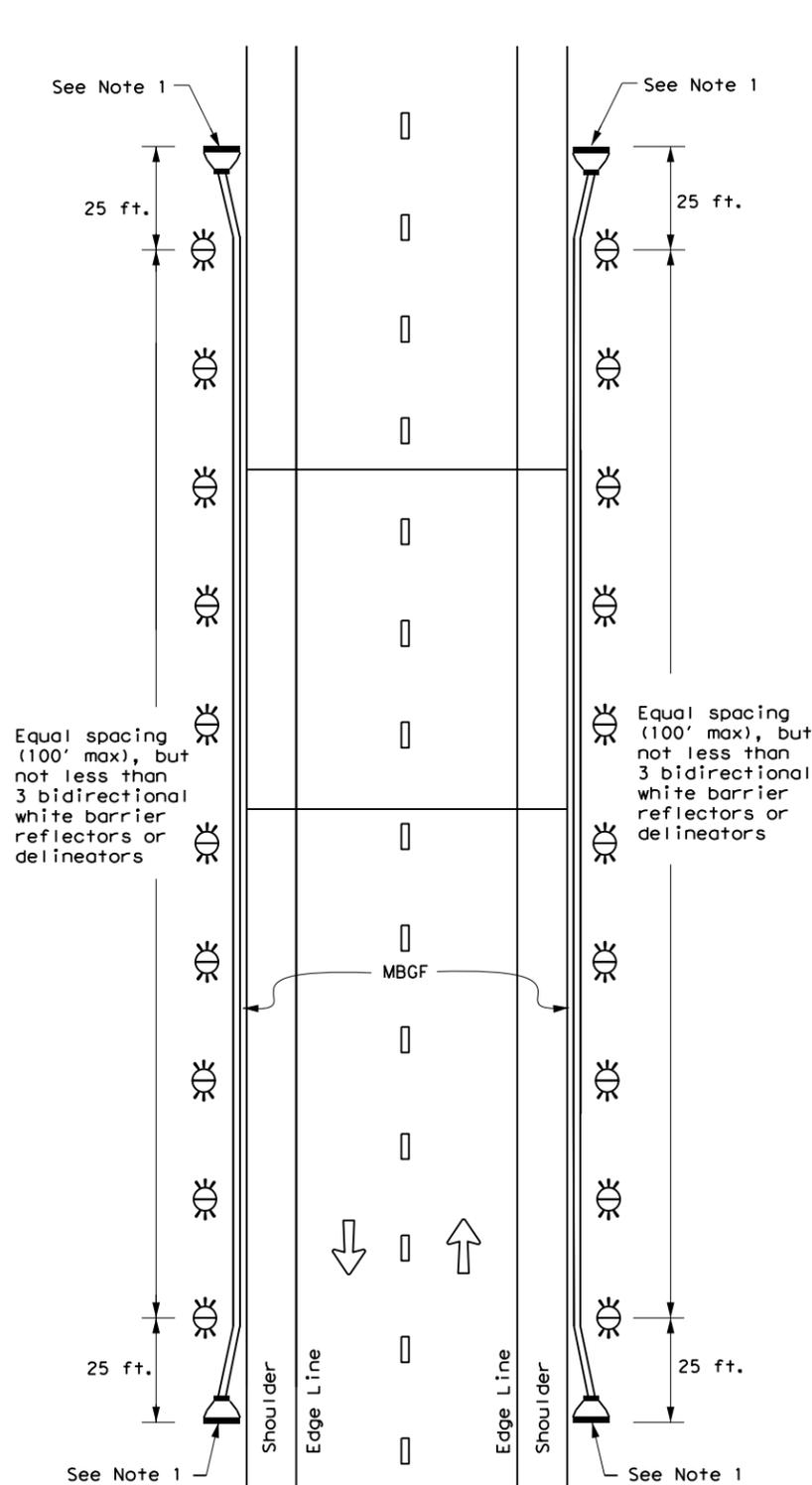
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

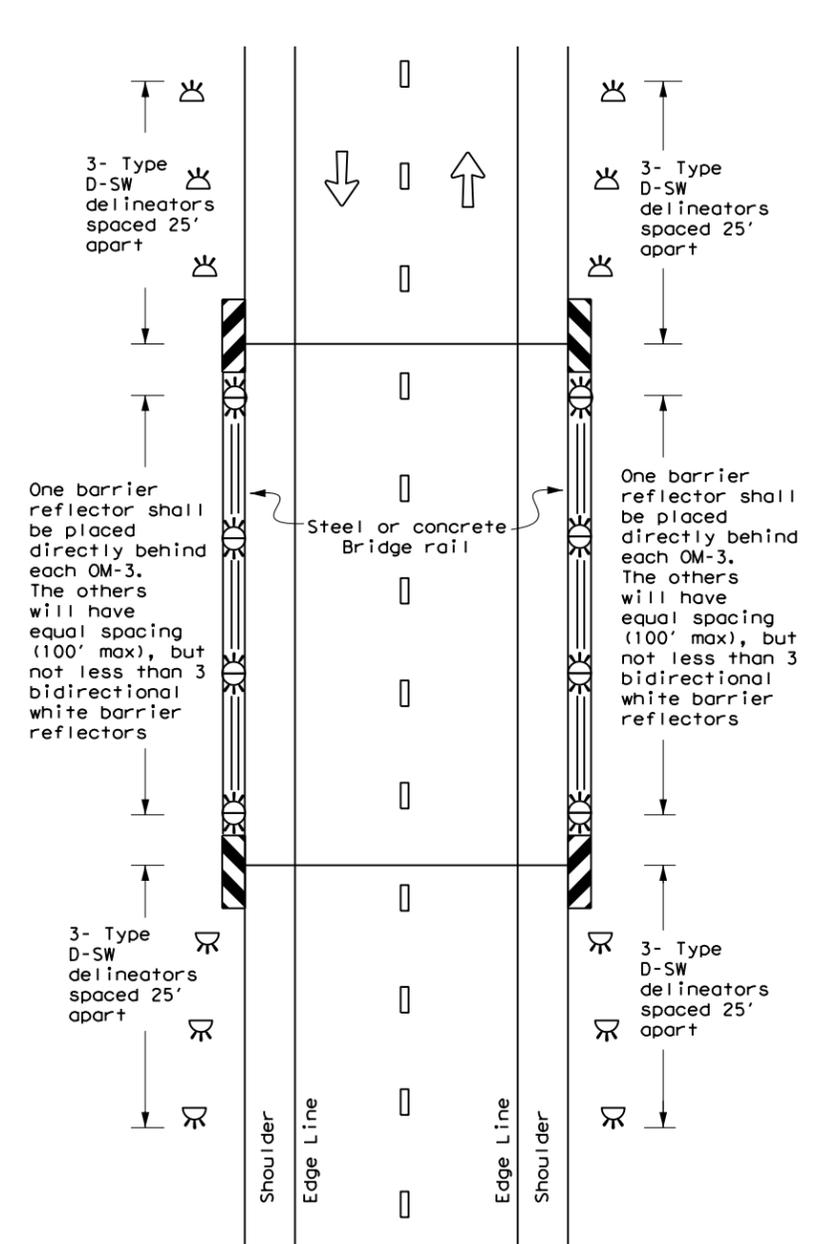
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY  
BRIDGE WITH NO APPROACH RAIL**



**LEGEND**

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

**D & OM(5) - 20**

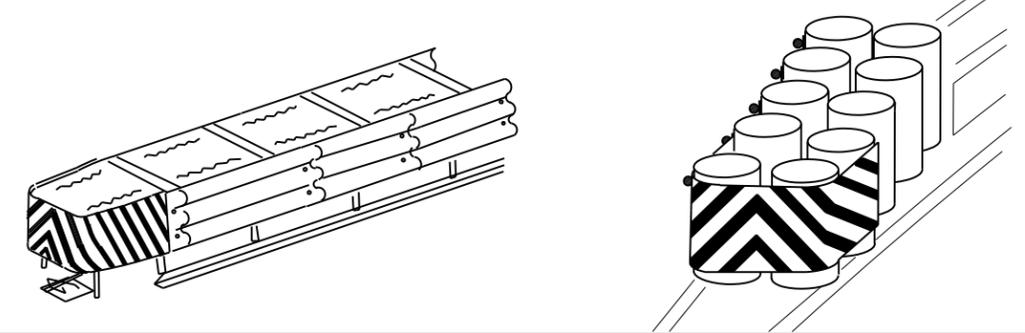
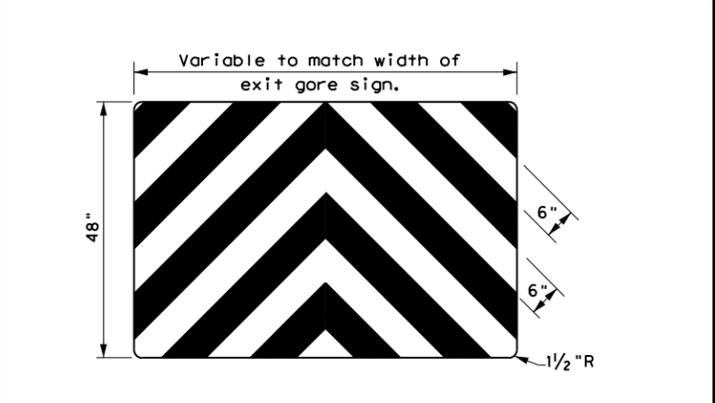
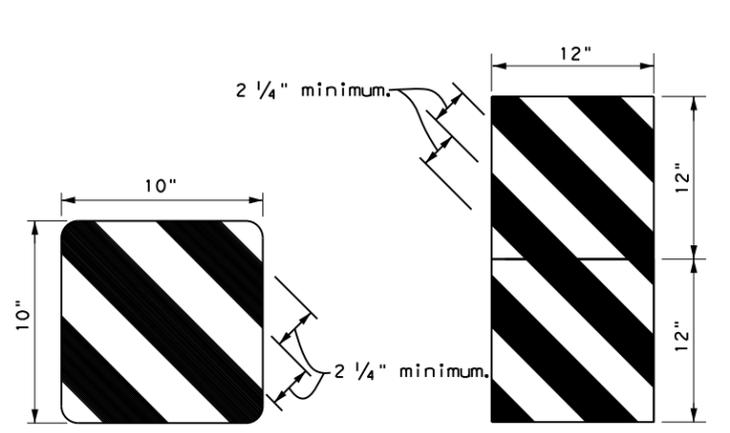
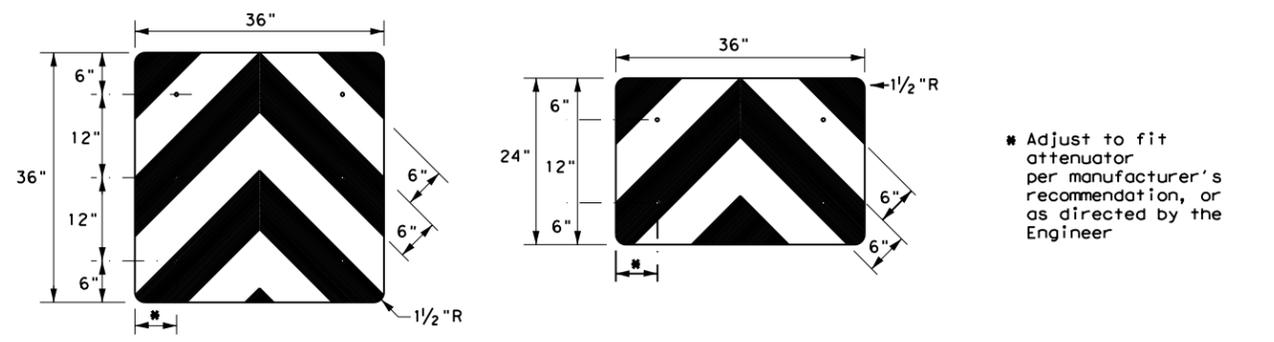
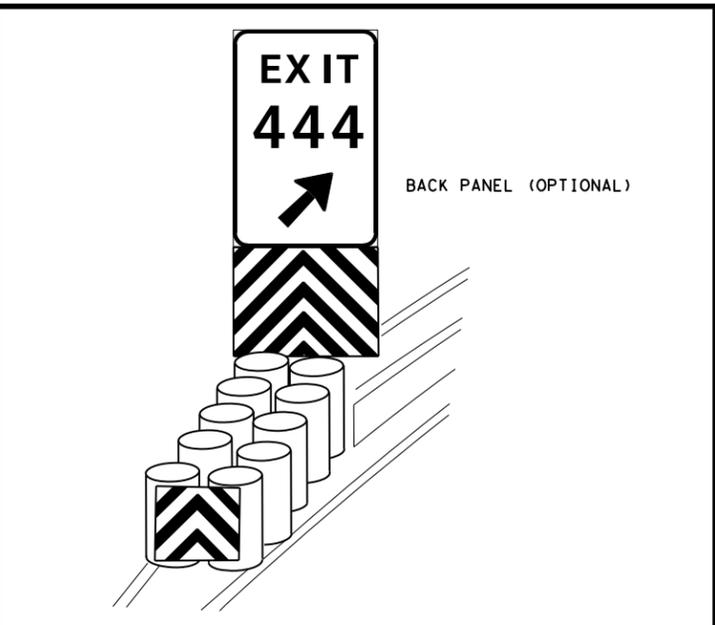
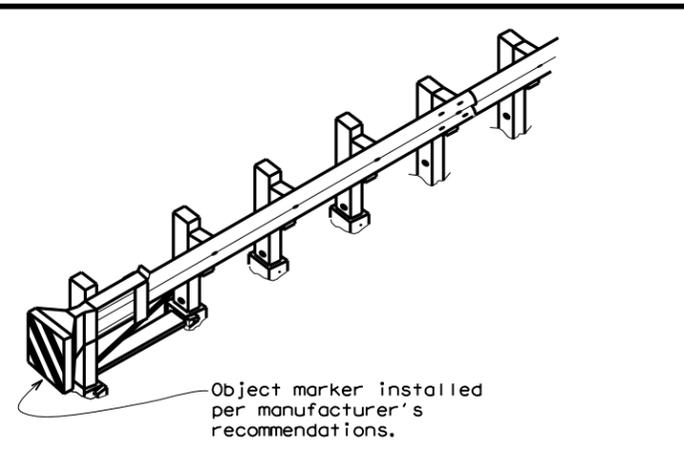
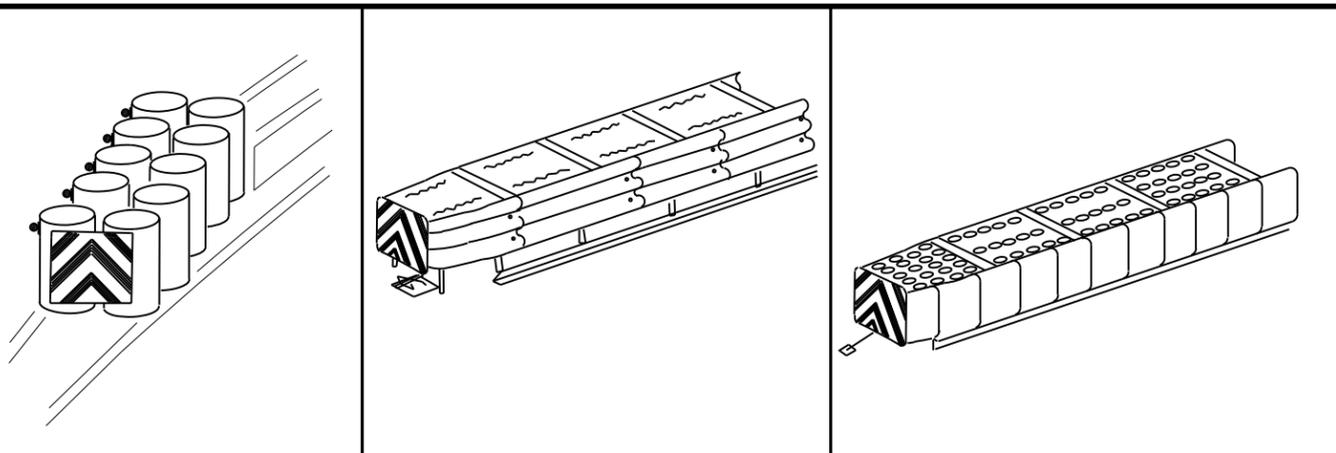
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© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
7-20	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	81	

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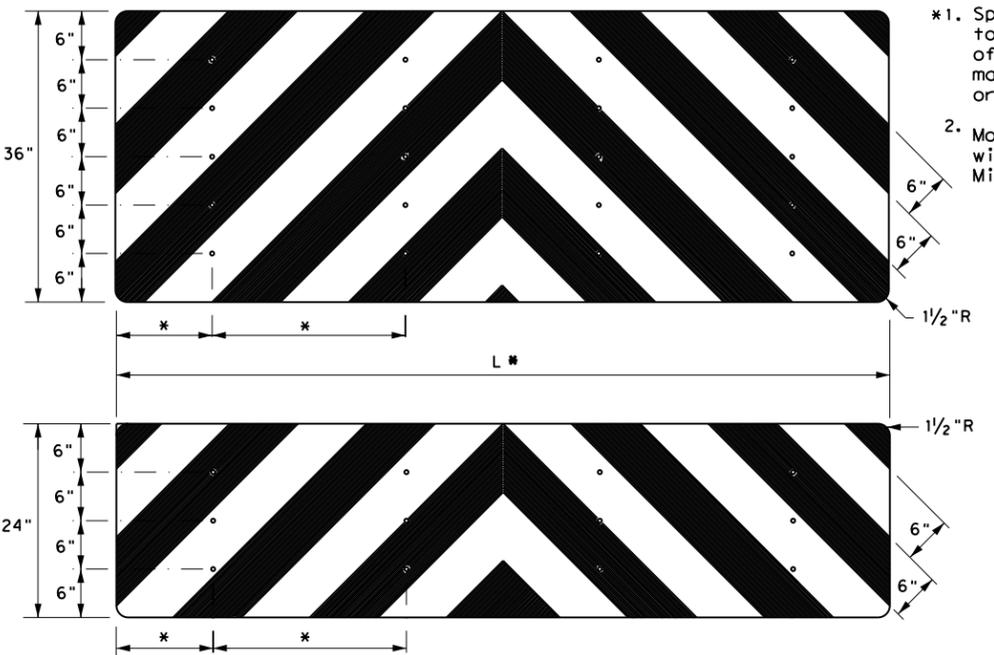
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OBJECT MARKERS SMALLER THAN 3 FT<sup>2</sup>

- NOTES**
- Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
  - Mounting should be flush with top of attenuator. Minimum size 96" x 24".



- NOTES**
- Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
  - Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
  - Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
  - Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
  - Object Marker at nose of attenuator is subsidiary to the attenuator.
  - See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation  
 Traffic Safety Division Standard

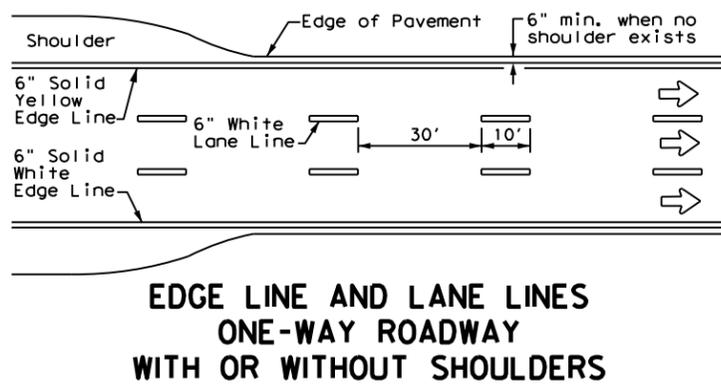
**DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS**  
**D & OM(VIA) -20**

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
© TXDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
4-92 8-04	DIST	COUNTY	SHEET NO.	
8-95 3-15	YKM	FAYETTE	82	
4-98 7-20				

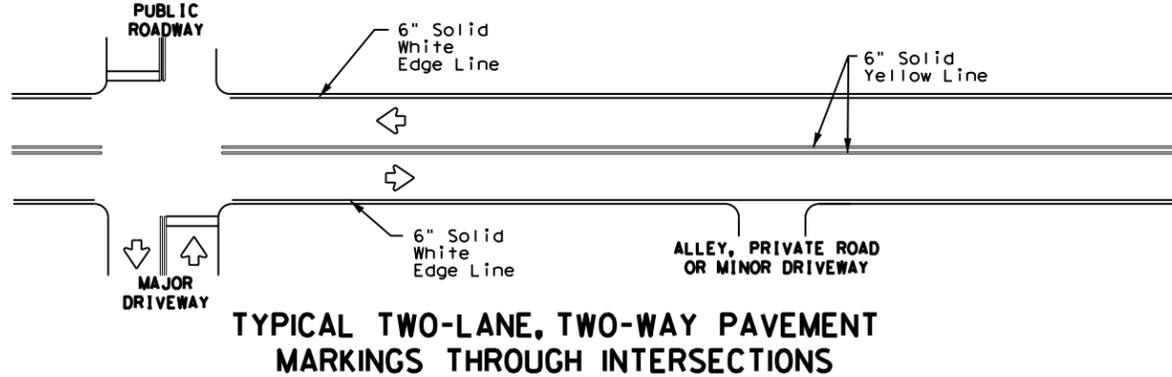
20G

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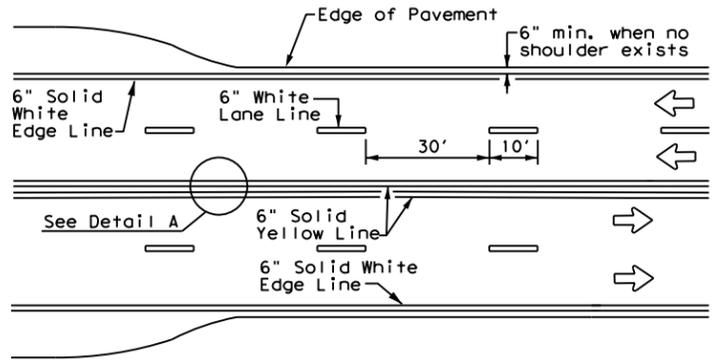
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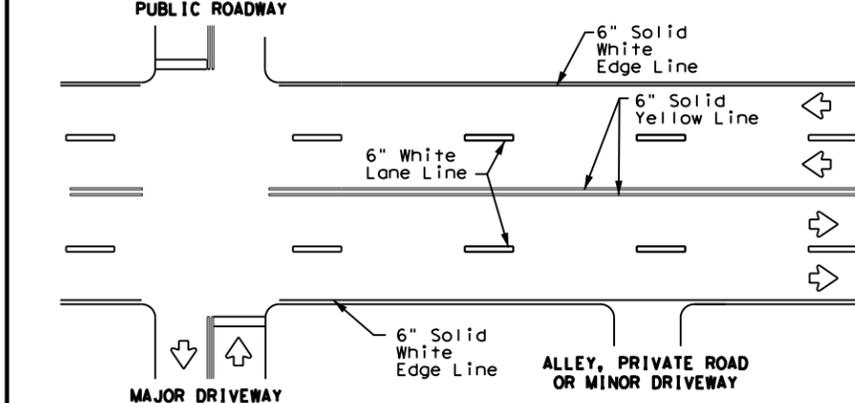
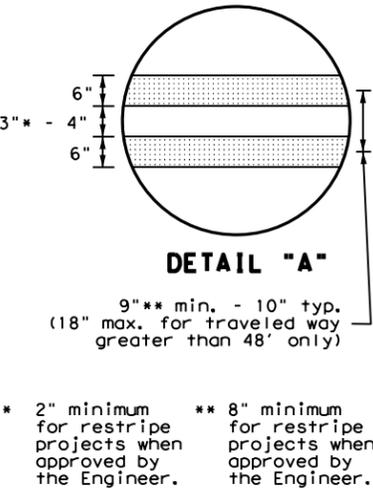
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



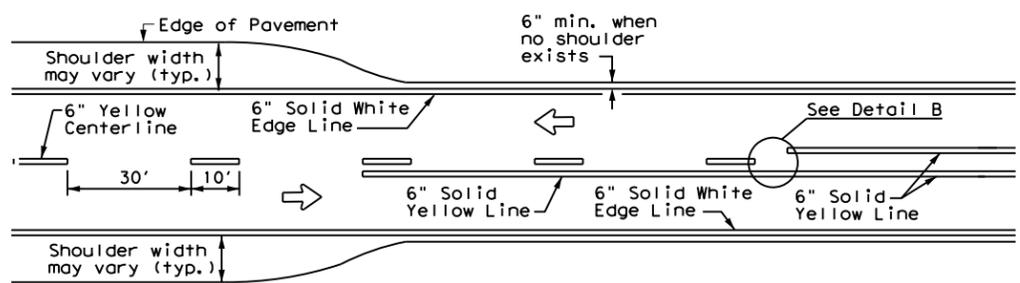
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



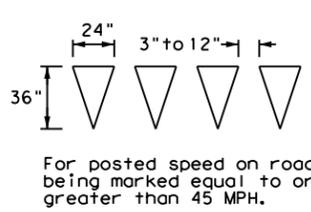
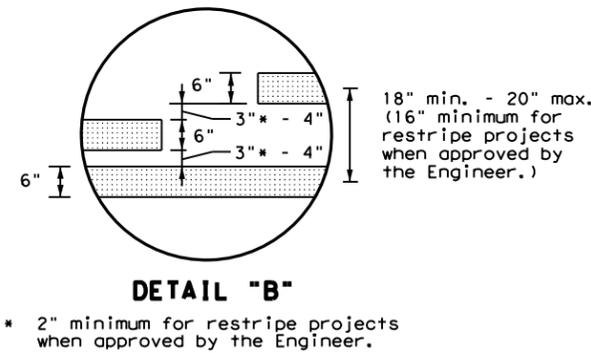
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



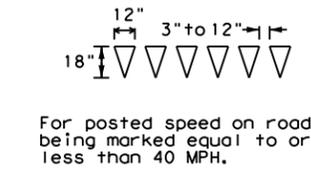
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



**TWO LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



**YIELD LINES**



**NOTES**

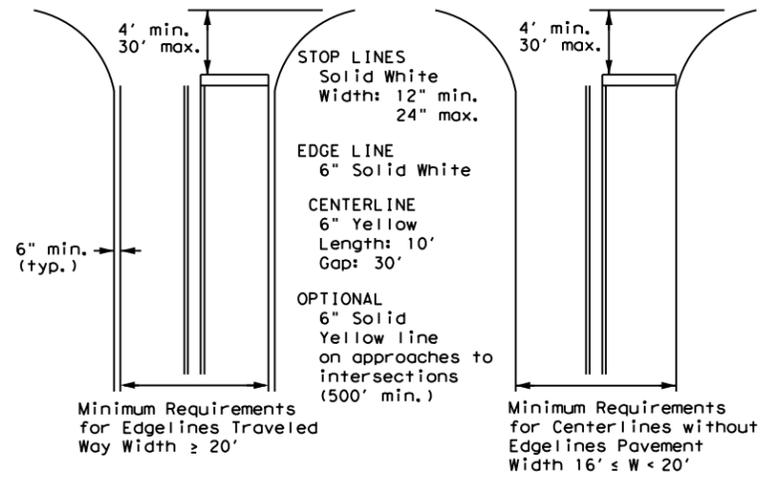
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

**GENERAL NOTES**

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

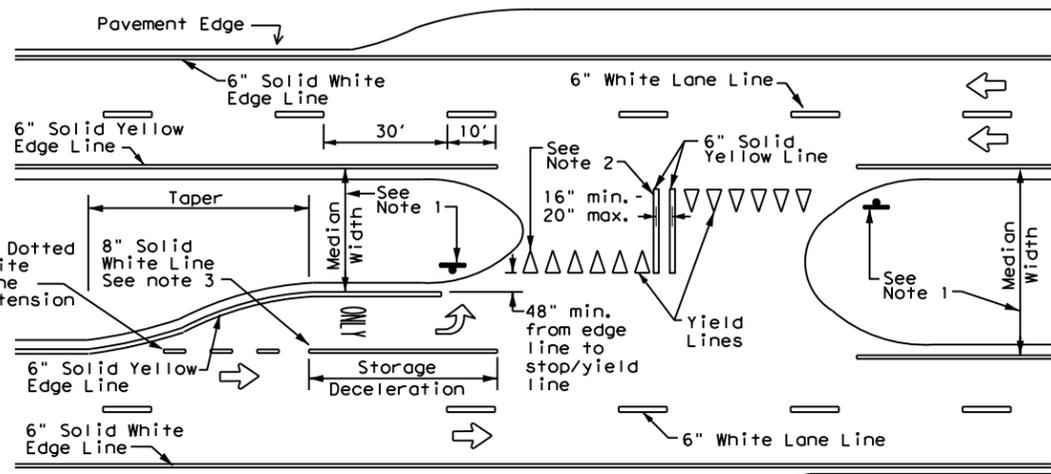
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

**GUIDE FOR PLACEMENT OF STOP LINES,  
EDGE LINE & CENTERLINE**  
 Based on Traveled Way and Pavement Widths for Undivided Roadways



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

Texas Department of Transportation  
 Traffic Safety Division Standard

**TYPICAL STANDARD  
PAVEMENT MARKINGS**

**PM(1) - 22**

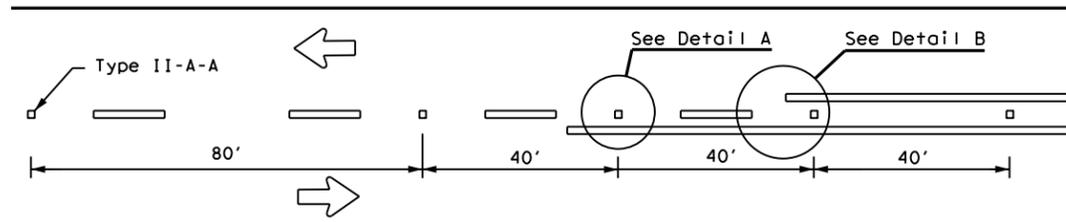
FILE: pml-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
11-78 8-00 6-20	DIST	COUNTY	SHEET NO.	
8-95 3-03 12-22	YKM	FAYETTE	83	
5-00 2-12				

22A

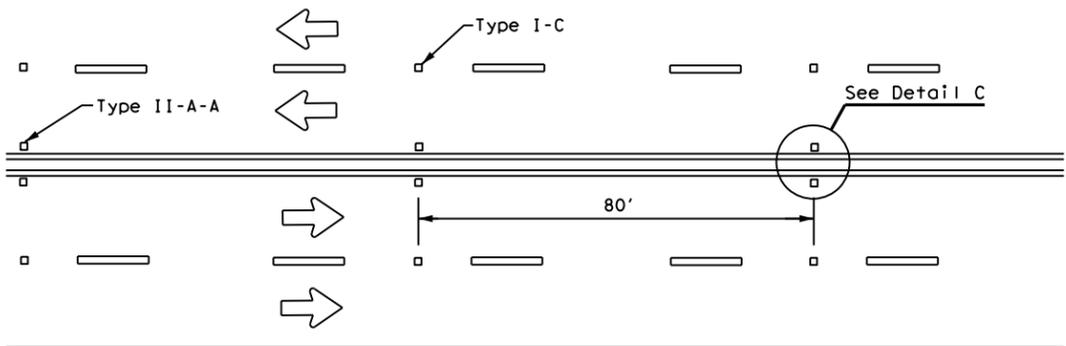
# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

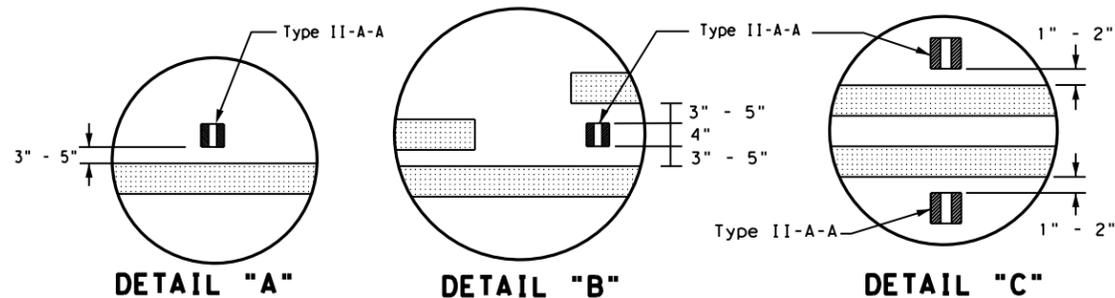
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**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



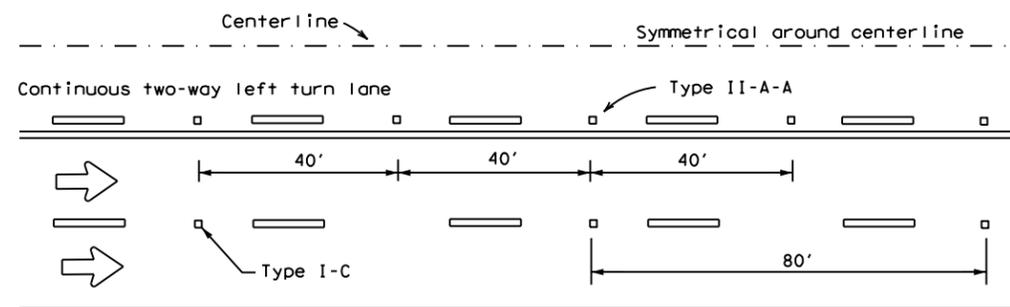
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



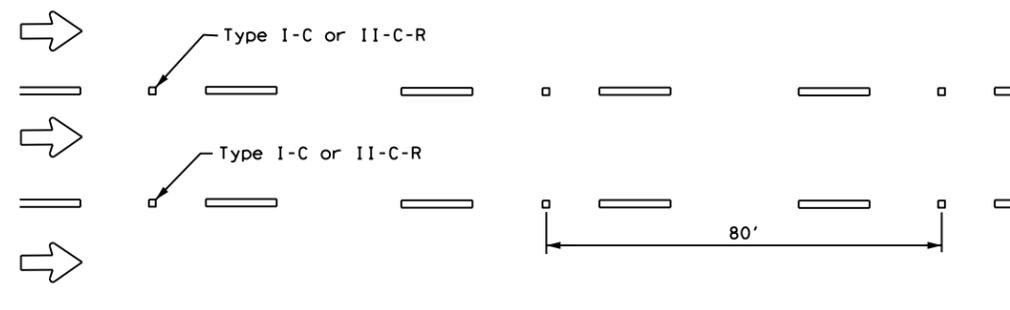
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

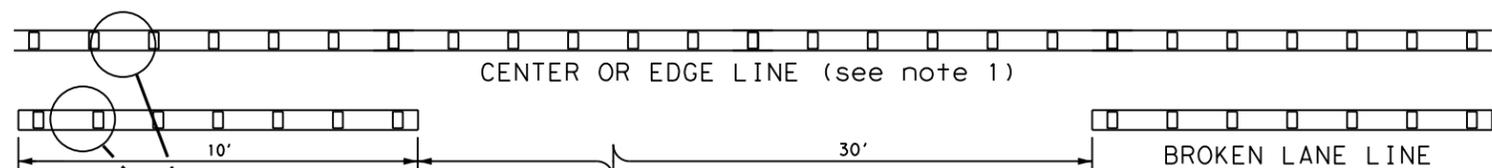


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

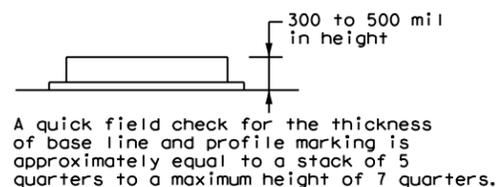
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
See Note 3.



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

6" EDGE LINE, 6" CENTERLINE  
OR 6" LANE LINE



**NOTES**

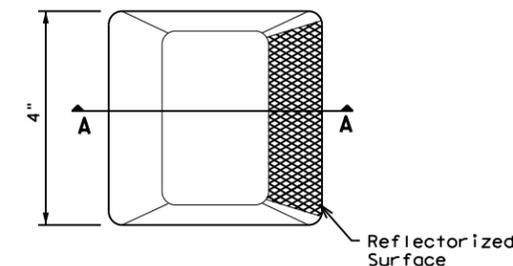
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

**GENERAL NOTES**

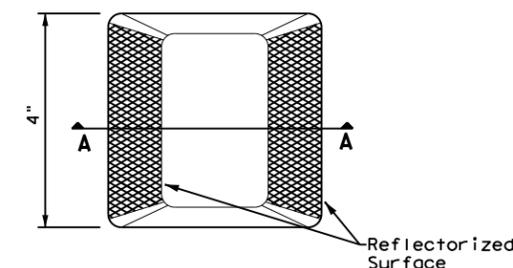
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

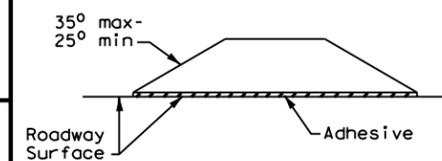
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

**RAISED PAVEMENT MARKERS**



**POSITION GUIDANCE USING  
RAISED MARKERS  
REFLECTORIZED PROFILE  
MARKINGS  
PM(2) - 22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	YKM	FAYETTE	84	
5-00 2-12				

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**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

0334-08-037

**1.2 PROJECT LIMITS:**

From: @ TRIB OF PIN OAK CREEK

To: \_\_\_\_\_

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 29°45'14.6346" N, (Long) 97°06'40.1816" W

END: (Lat) 29°45'22.3181" N, (Long) 97°06'35.6491" W

**1.4 TOTAL PROJECT AREA (Acres): APPROX. 1.60 AC**

**1.5 TOTAL AREA TO BE DISTURBED (Acres): 1.60 AC**

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

CONSTRUCTION OF BRIDGE REPLACEMENT CONSISTING OF REPLACE BRIDGE AND APPROACHES.

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
RUTERSVILLE	LOAMY FINE SAND, 0 TO 2 PERCENT SLOPES
SINGLETON	FINE SANDY LOAM, 1 TO 3 PERCENT SLOPES
UHLAND	CLAY LOAM, FREQUENTLY FLOODED

**1.8 PROJECT SPECIFIC LOCATIONS (PSLs):**

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

**1.9 CONSTRUCTION ACTIVITIES:**

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- X Mobilization
- X Install sediment and erosion controls
- X Blade existing topsoil into windrows, prep ROW, clear and grub
- X Remove existing pavement
- X Grading operations, excavation, and embankment
- X Excavate and prepare subgrade for proposed pavement widening

- Remove existing culverts, safety end treatments (SETs)
- X Remove existing metal beam guard fence (MBGF), bridge rail
- X Install proposed pavement per plans

- Install culverts, culvert extensions, SETs
- X Install mow strip, MBGF, bridge rail

- X Place flex base
- X Rework slopes, grade ditches
- X Blade windrowed material back across slopes
- X Revegetation of unpaved areas
- X Achieve site stabilization and remove sediment and erosion control measures

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.10 POTENTIAL POLLUTANTS AND SOURCES:**

- X Sediment laden stormwater from stormwater conveyance over disturbed area
- X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- X Solvents, paints, adhesives, etc. from various construction activities
- X Transported soils from offsite vehicle tracking
- X Construction debris and waste from various construction activities
- X Contaminated water from excavation or dewatering pump-out water
- X Sanitary waste from onsite restroom facilities
- X Trash from various construction activities/receptacles
- X Long-term stockpiles of material and waste

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.11 RECEIVING WATERS:**

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
PIN OAK CREEK	N/A
BUCKNERS CREEK STREAM NO. 1402C	FRESHWATER STREAM
COLORADO RIVER BELOW LA GRANGE STREAM NO. 1402	FRESHWATER STREAM
COLORADO RIVER TIDAL STREAM NO. 1401	TIDAL STREAM
MATAGORDA BAY/POWDERHORN LAKE STREAM NO. 2451	ESTUARY

\* Add (\*) for impaired waterbodies with pollutant in ( ).

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

MS4 Entity

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**



Sheet 1 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				85
STATE	STATE DIST.	COUNTY		
TEXAS	YKM	FAYETTE		
CONT.	SECT.	JOB	HIGHWAY NO.	
0334	08	037	FM 154	

**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

**2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE**

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

**2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:**

**T / P**

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.2 SEDIMENT CONTROL BMPs:**

**T / P**

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- Sediment Trap
  - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
  - Not required (<10 acres disturbed)
  - Required (>10 acres) and implemented.
    - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - 3,600 cubic feet of storage per acre drained
  - Required (>10 acres), but not feasible due to:
    - Available area/Site geometry
    - Site slope/Drainage patterns
    - Site soils/Geotechnical factors
    - Public safety
    - Other: \_\_\_\_\_

**2.3 PERMANENT CONTROLS:**

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.5 POLLUTION PREVENTION MEASURES:**

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

**2.6 VEGETATED BUFFER ZONES:**

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To
<b>VEGETATIVE BUFFER NEST TO PIN OAK CREEK</b>	<b>132+79</b>	<b>133+38</b>

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

**2.8 INSPECTIONS:**

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

**2.9 MAINTENANCE:**

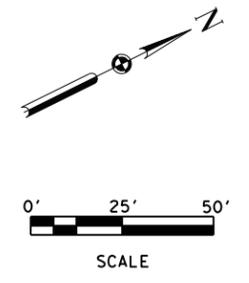
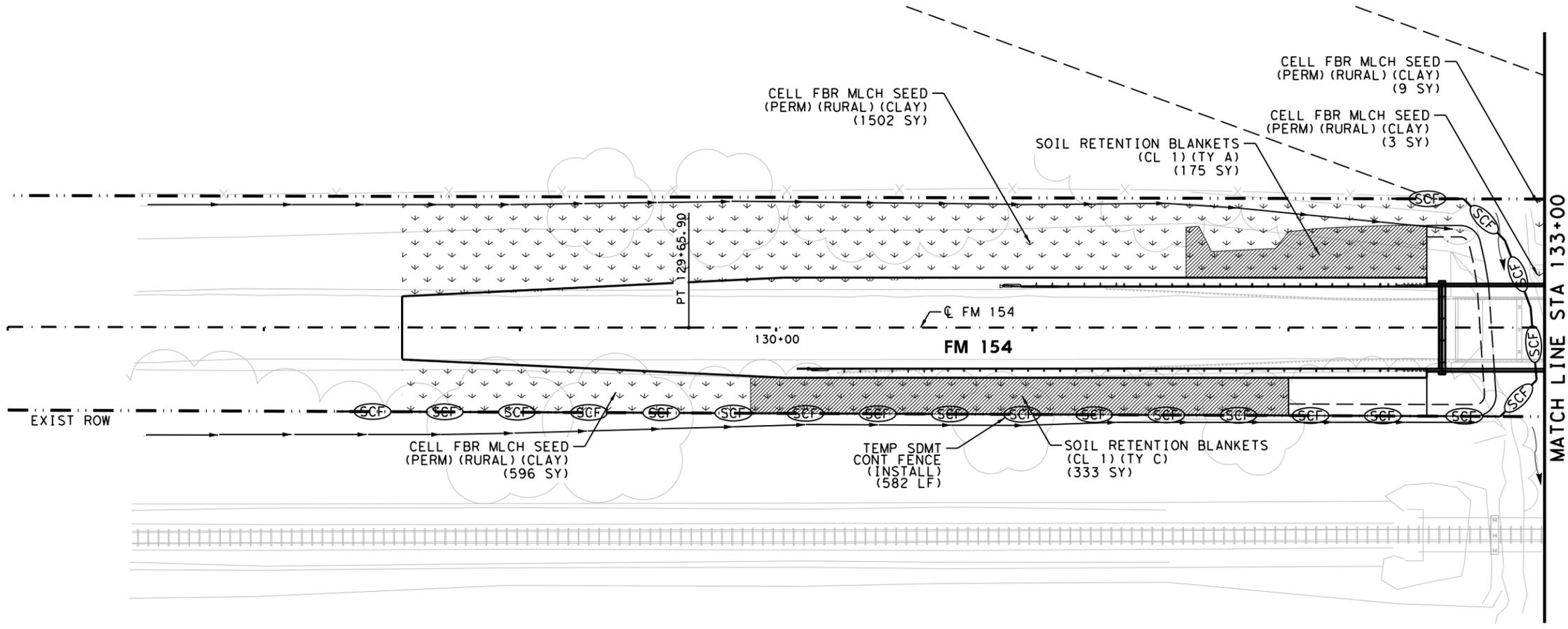
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

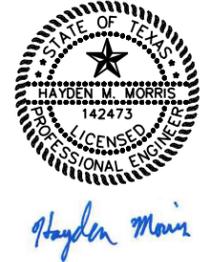
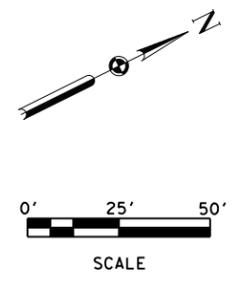
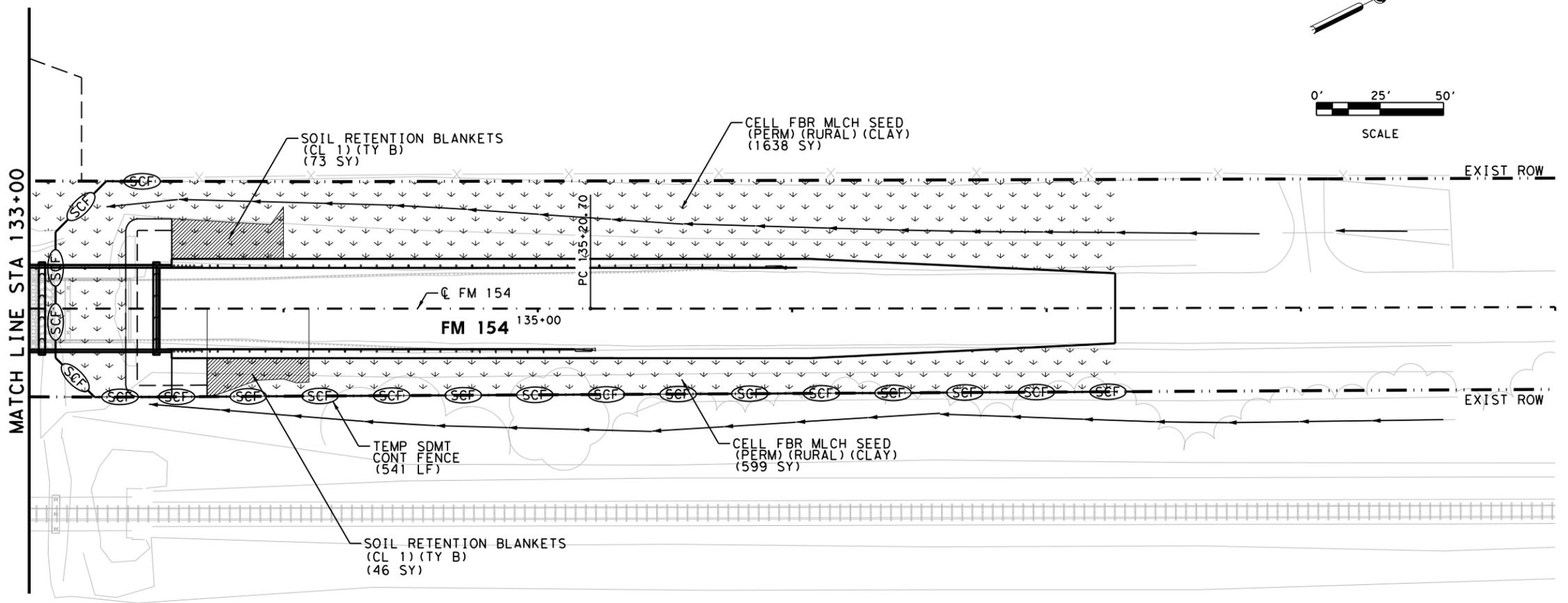


FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				86
STATE	STATE DIST.	COUNTY		
TEXAS	YKM	FAYETTE		
CONT.	SECT.	JOB	HIGHWAY NO.	
0334	08	037	FM 154	

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- LEGEND**
- CULVERT FLOW
  - DITCH FLOW
  - ROCK FILTER DAM
  - SEDIMENT CONTROL FENCE



03/07/2023

**Kimley»Horn** F-928



FM 154 AT PIN OAK CREEK

**SWP3 LAYOUT**

SHEET 1 OF 1

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		FM 154
STATE	DIST.	COUNTY
TEXAS	YOAKUM	FAYETTE
CONT.	SECT.	JOB
0334	08	037
		SHEET NO.
		87

**I. STORMWATER POLLUTION PREVENTION**

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. If applicable list MS4 operator that may receive discharges from this project. MS4 operator should be notified prior to construction activities.

Prevent stormwater pollution erosion and sedimentation in accordance with TPDES Permit TXR 150000. +

Comply with the SW3P and revise when necessary to control pollution or as required by the Engineer. +

Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA, or other inspectors.

When Contractor project specific locations (PSL) increase disturbed soil area to 5 acres or more, submit Notice of Intent (NOI) to TCEQ and Engineer. +

MS4 Operator(s): Victoria +

No Additional Comments

**II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS**

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

No USACE Permit Required

Work is authorized by the USACE under a Nationwide Permit 14 without a

Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set.

Work is authorized by the USACE under a Nationwide Permit 14 with a

Pre-Construction Notification (PCN). The project specific permit issued by the USACE is included in the plan set.

Work is authorized by the USACE under a Individual Permit (IP). The project specific permit issued by the USACE is included in the plan set.

Work would be authorized by the USACE. The project specific permit issued by the USACE or Nationwide Permit will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

No United States Coast Guard (USCG) Coordination Required

United States Coast Guard (USCG) Permit

United States Coast Guard (USCG) Exemption

Best Management Practices +

Erosion	Sedimentation	Post Construction TSS <span style="float: right;">+</span>
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input checked="" type="checkbox"/> Vegetative Filter Strips <span style="float: right;">+</span>
<input type="checkbox"/> Mulch	<input type="checkbox"/> Rock Filter Dam	<input type="checkbox"/> Vegetation Lined Ditches
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Grassy Swales

No Additional Comments

**III. CULTURAL RESOURCES**

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the area and contact the Engineer immediately.

No Additional Comments

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications 162, 164, 192, 193, 506, 730, 751, and 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

Additional Comments

-Minimize the amount of vegetation proposed for clearing. Removal of native vegetation, particularly mature native trees and scrubs, will be avoided to the greatest extent possible.

-The use of any non-native plant species in re-vegetation will be discouraged.

-Avoid vegetation clearing activities during the general nesting season.

**V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS**

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

Additional Comments

Eastern Spotted Skunk (Spilogale putorius)  
The Eastern spotted skunk has the potential to occur within the project area. The contractor shall avoid harming or killing the species during construction and allow it to leave the area safely, should it enter the project site.

Additional Comments

Lead paint in gray paint on steel columns of bridge.

**VII. ADDITIONAL ENVIRONMENTAL COMMENTS & ISSUES**

Comments:

The contractor's attention is directed to the fact that discharges of permanent or temporary fill material into the waters of the United States, including jurisdictional wetlands, as necessary for construction, will require specific approval of the USACE under Section 404 of the Clean Water Act.

TxDOT will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and it's potential to affect USACE jurisdictional areas. The contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the contractor responsible for following all conditions of the approved permit. If the contractor cannot work within the limits of the permit(s), then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the exiting permit(s) as originally obtained by the department.

Particular importance is stressed on the fact that nay impacts to USACE jurisdictional waters of the United States, including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The contractor shall maintain near normal flow of any jurisdictional waters of the United States at all times during construction. If the contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Yoakum District Environmental Coordinator.

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)? Yes  No

Are results of the asbestos inspection positive (is asbestos present)? Yes  No

TxDOT is still required to notify DSHS 14 working days prior to any scheduled demolition.

The Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Additional Comments

Lead paint in gray paint on steel columns of bridge.

**VII. ADDITIONAL ENVIRONMENTAL COMMENTS & ISSUES**

Comments:

The contractor's attention is directed to the fact that discharges of permanent or temporary fill material into the waters of the United States, including jurisdictional wetlands, as necessary for construction, will require specific approval of the USACE under Section 404 of the Clean Water Act.

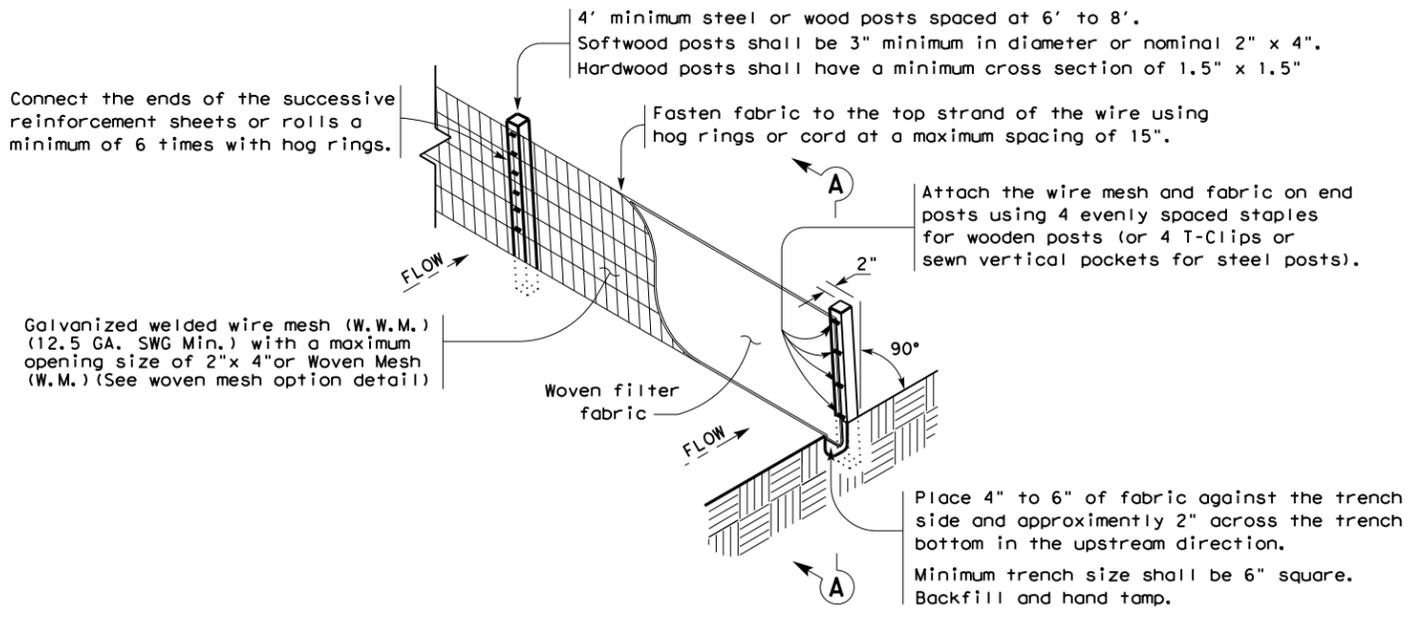
TxDOT will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and it's potential to affect USACE jurisdictional areas. The contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the contractor responsible for following all conditions of the approved permit. If the contractor cannot work within the limits of the permit(s), then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the exiting permit(s) as originally obtained by the department.

Particular importance is stressed on the fact that nay impacts to USACE jurisdictional waters of the United States, including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The contractor shall maintain near normal flow of any jurisdictional waters of the United States at all times during construction. If the contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Yoakum District Environmental Coordinator.

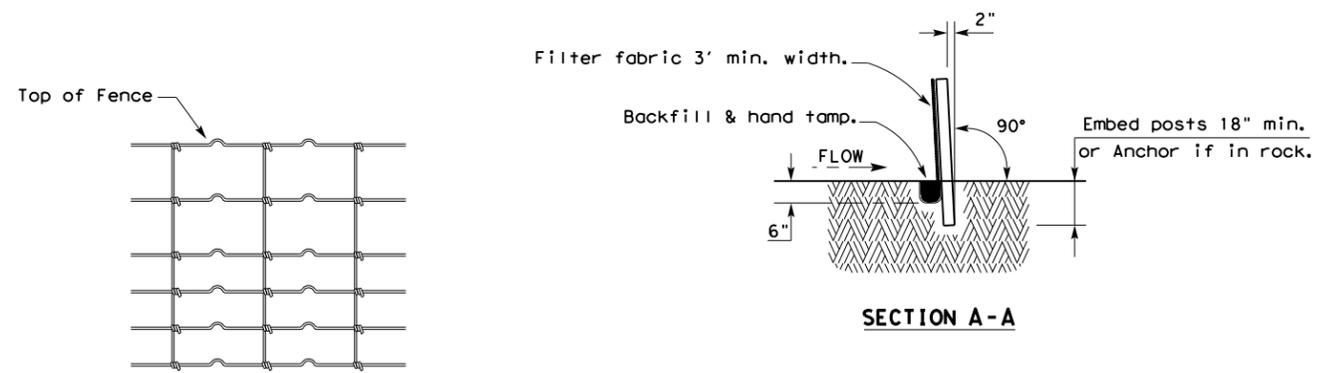
		TxDOT Yoakum District
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>		
<b>EPIC</b>		
FILE: EPIC Sheet.dgn	DN:	CK:
© TxDOT: March 2017	CONT SECT	JOB HIGHWAY
REVISIONS	0334 08	037 FM 154
UPDATED section V, text and added definition (10/17) ADDED USCG and USACE notes in Section VII (04/18)	DIST	COUNTY SHEET NO.
	YKM	FAYETTE 88

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor's degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

3/6/2023  
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**TEMPORARY SEDIMENT CONTROL FENCE**



**HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL**

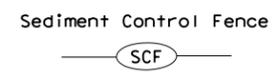
Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

**SEDIMENT CONTROL FENCE USAGE GUIDELINES**

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

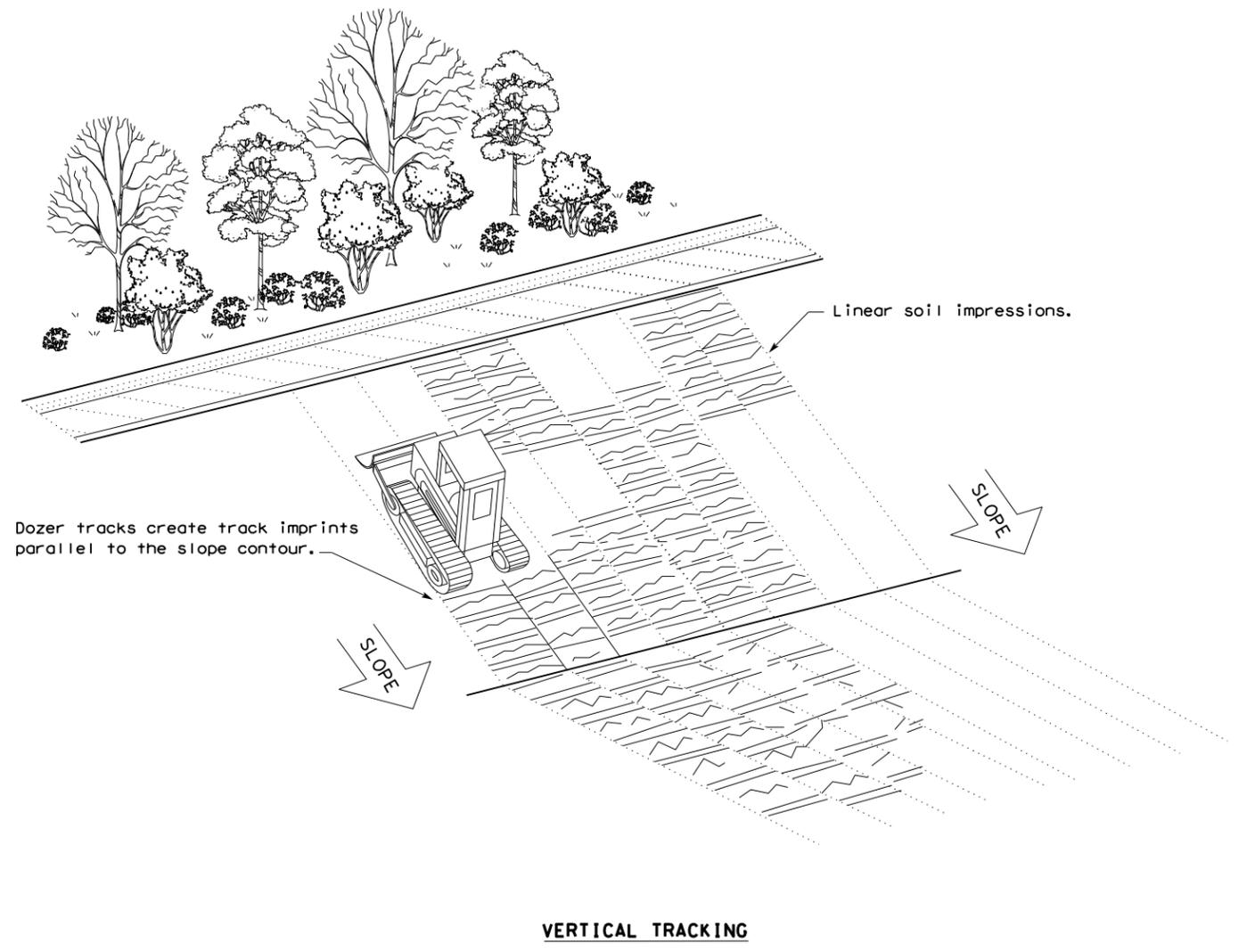
Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT<sup>2</sup>. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

**LEGEND**



**GENERAL NOTES**

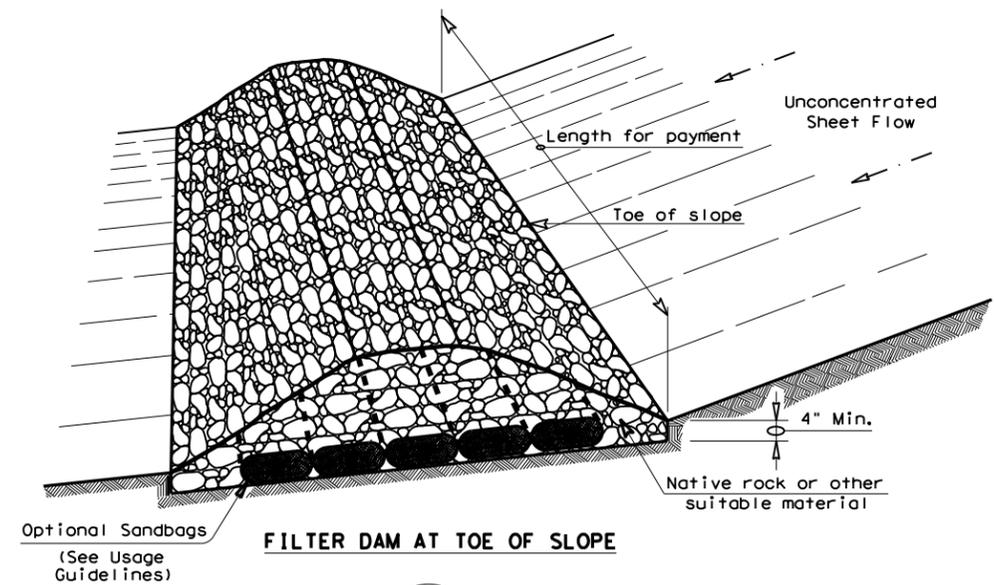
1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



**TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1) - 16**

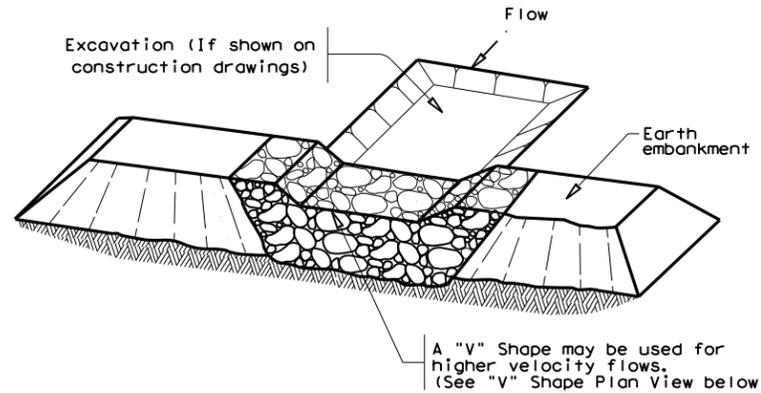
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0334	08	037	FM 154
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	89	

DATE: 3/6/2023  
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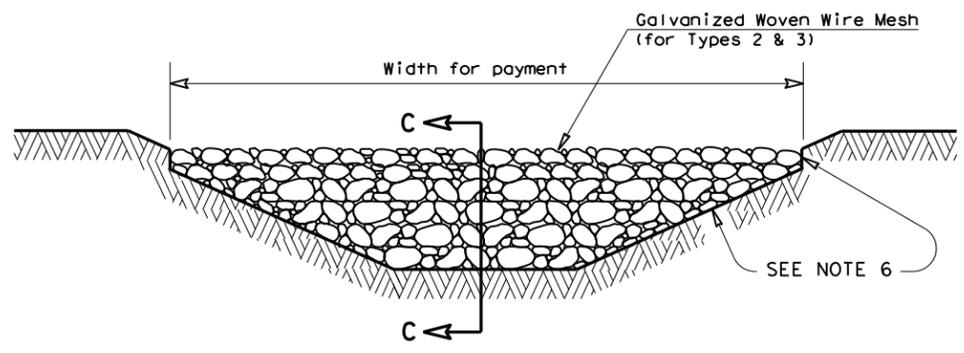
**FILTER DAM AT TOE OF SLOPE**

RFD1



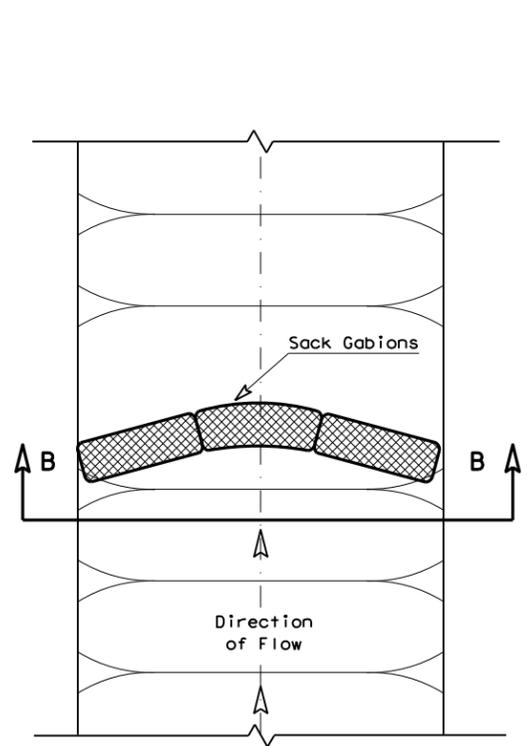
**FILTER DAM AT SEDIMENT TRAP**

RFD1 OR RFD2

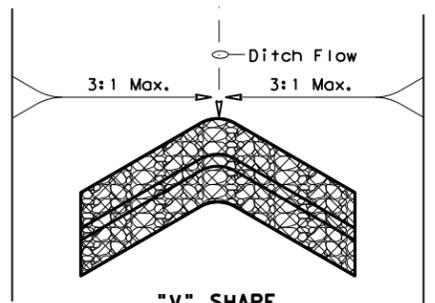


**FILTER DAM AT CHANNEL SECTIONS**

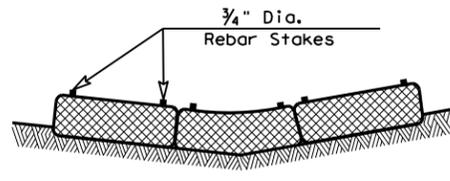
RFD1 OR RFD2 OR RFD3



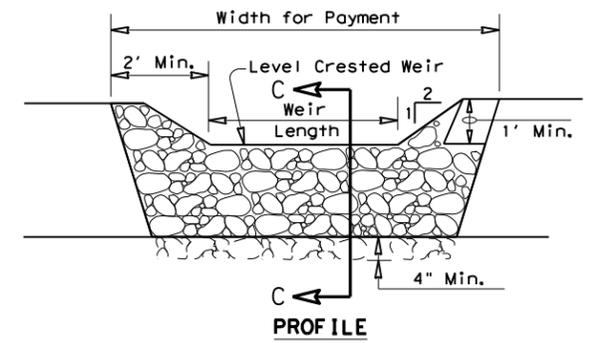
**PLAN VIEW**



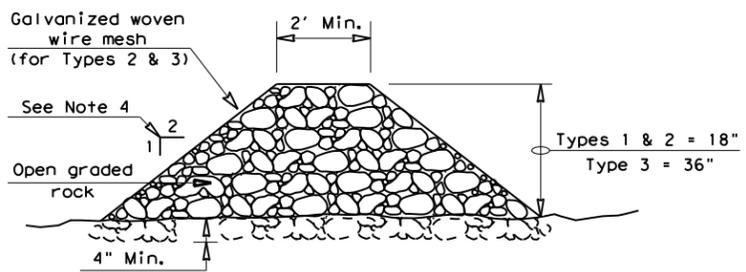
**"V" SHAPE PLAN VIEW**



**SECTION B-B**



**PROFILE**



**SECTION C-C**

**ROCK FILTER DAM USAGE GUIDELINES**

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT<sup>2</sup> of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

**Type 2 (18" high with wire mesh) (3" to 6" aggregate):** Type 2 may be used in ditches and at dike or swale outlets.

**Type 3 (36" high with wire mesh) (4" to 8" aggregate):** Type 3 may be used in stream flow and should be secured to the stream bed.

**Type 4 (Sack gabions) (3" to 6" aggregate):** Type 4 May be used in ditches and smaller channels to form an erosion control dam.

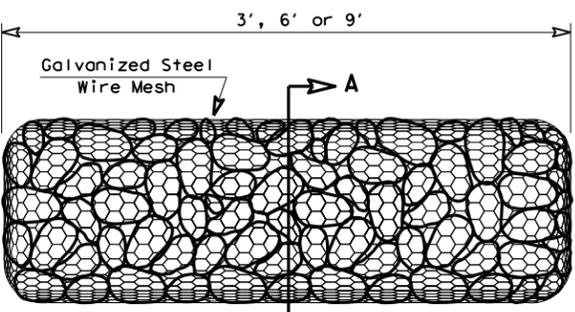
**Type 5:** Provide rock filter dams as shown on plans.

**GENERAL NOTES**

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

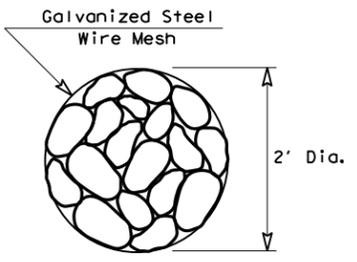
**PLAN SHEET LEGEND**

- Type 1 Rock Filter Dam — RFD1 —
- Type 2 Rock Filter Dam — RFD2 —
- Type 3 Rock Filter Dam — RFD3 —
- Type 4 Rock Filter Dam — RFD4 —



**TYPE 4 (SACK GABIONS)**

RFD4



**SECTION A-A**

		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>ROCK FILTER DAMS</b> <b>EC(2) - 16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0334 08	037	FM 154
	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	90

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DATE: \_\_\_\_\_  
 FILE: \_\_\_\_\_

**I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)**

DOT #: NONE  
 Crossing Type: **\*\* NONE**  
 RR Company Owning Track at Crossing: UNION PACIFIC RAILROAD  
 Operating RR Company at Track: UNION PACIFIC RAILROAD  
 RR MP: NEAR 106.630  
 RR Subdivision: CUERO  
 City: FLATONIA  
 County: FAYETTE  
 CSJ at this Crossing: 0334-08-037  
 Highway/Roadway name crossing the railroad: FM 154  
 # of regularly scheduled trains per day at this crossing: N/A  
 # of switching movements per day at this crossing: N/A  
 % of estimated contract cost of work within railroad ROW: N/A

Scope of Work at this Crossing to Be Performed by State Contractor:  
REPLACE BRIDGE & APPROACHES. NO RAILROAD CROSSING IN PROJECT LIMITS. THE RAILROAD IS PARALLEL TO ROADWAY/PROJECT. ALL WORK & EQUIPMENT WILL BE OUTSIDE OF RAILROAD RIGHT OF WAY. ROADWAY WILL BE CLOSED FOR THE DURATION OF THIS PROJECT.

Scope of Work at this Crossing to Be Performed by Railroad Company:  
NONE

\*\* Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

**II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)**

NONE

**III. FLAGGING & INSPECTION**

# of Days of Railroad Flagging Expected: N/A

On this project, night or weekend flagging is:

- Expected  
 Not Expected

Flagging services will be provided by:

- Railroad Company: TxDOT will pay flagging invoices  
 Railroad Company at no cost, because this railroad exists via TxDOT spur permit  
 Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- UPRR - UP.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 BNSF - BNSF.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 KCS - KCS.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 - Bottom Line On-Track Safety Services  
 bottomline076@aol.com, 903-767-7630

OTHERS \_\_\_\_\_  
 \_\_\_\_\_

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- Not Required  
 Required: Contact Information for Construction Inspections:

\_\_\_\_\_  
 \_\_\_\_\_

**IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD**

On this project, construction work to be performed by a railroad company is:

- Required  
 Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

**V. RAILROAD INSURANCE REQUIREMENTS**

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	\$500,000 / \$500,000 / \$500,000
Commercial General Liability	\$2,000,000 / \$4,000,000
Business Automobile	\$2,000,000 combined single limit
Railroad Protective Liability	
<input checked="" type="checkbox"/> Not Required	
<input type="checkbox"/> Non - Bridge Projects	\$2,000,000 / \$6,000,000
<input type="checkbox"/> Bridge Projects	\$5,000,000 / \$10,000,000
<input type="checkbox"/> Other	

**VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT**

On this project, an ROE agreement is:

- Not Required  
 Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)  
 Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: \_\_\_\_\_

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

<http://www.txdot.gov/inside-txdot/division/rail/samples.html>

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

**VII. RAILROAD COORDINATION MEETING**

On this project, a Railroad Coordination Meeting is:

- Not Required  
 Required

See Item 5, Article 8.1 for more details.

**VIII. SUBCONTRACTORS**

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

**IX. EMERGENCY NOTIFICATION**

**In Case of Railroad Emergency**  
**Call UNION PACIFIC RAILROAD**  
**Railroad Emergency Line at 888-877-7267**  
**Location: PARALLEL & NEAREST TO DOT 744653G**  
**RR Milepost: NEAR 106.630**  
**Subdivision: CUERO**

 Texas Department of Transportation				Rail Division	
RAILROAD SCOPE OF WORK PROJECT SPECIFIC DETAILS					
FILE:	RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
© TxDOT	June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0334	08	037	FM 154
3/2020		DIST	COUNTY		SHEET NO.
		YKM	FAYETTE		91